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THE INDUSTRIAL-ARTS MAGAZINE

OCTOBER · 1923

The Bruce Publishing Company
Milwaukee · Wis ·

ATKINS
SILVER STEEL SAWS

There is no substitute for the tested quality of Atkins Silver Steel Saws. We manufacture a complete line of them and they represent the highest standards of

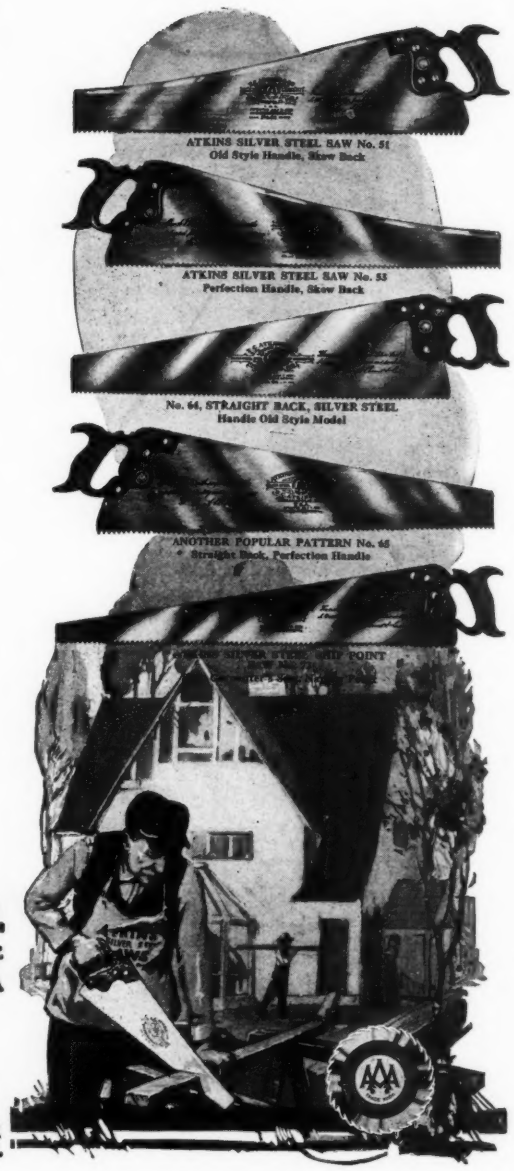
QUALITY - WORKMANSHIP - and UTILITY

Every master carpenter and manual training teacher knows the service, value and reputation back of Atkins Saws. Leading hardware dealers sell them with a guarantee that protects the user.

Our Trained and skilled workmen leave nothing undone that should be done to make Atkins products,

"The Finest on Earth"

SPECIAL: Give us the name of your hardware dealer, and enclose thirty cents in stamps for which we will send you high grade nail apron, Saw Sense Book and useful souvenir.


ATKINS SILVER STEEL SAW No. 51
Old Style Handle, Skew Back
ATKINS SILVER STEEL SAW No. 53
Perfection Handle, Skew Back
No. 64, STRAIGHT BACK, SILVER STEEL
Handle Old Style Model
ANOTHER POPULAR PATTERN No. 65
Straight Back, Perfection Handle

E.C. ATKINS & CO.

ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario

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Branches Carrying Complete Stocks In The Following Cities:

Atlanta	New Orleans	Seattle
Memphis	New York City	Paris, France
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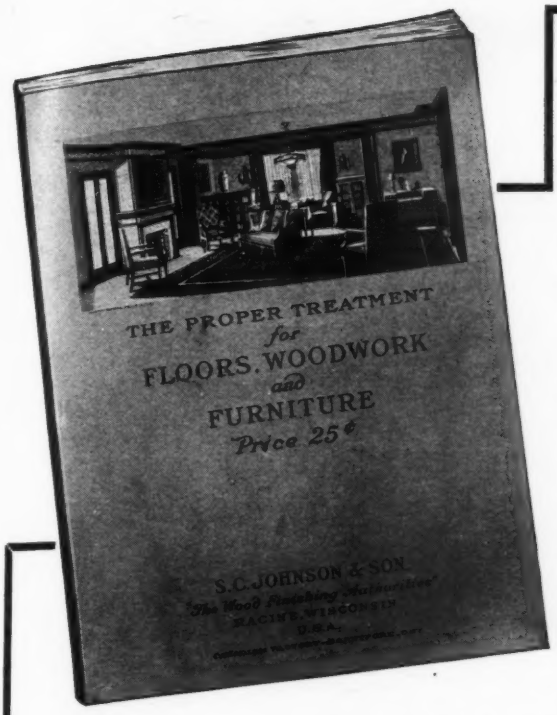
Minneapolis	San Francisco	Vancouver, B.C.



Get Your Copy of This Book

It's the best book ever published on Artistic Wood Finishing and should be in the hands of every Wood Finishing Instructor. It is full of valuable information on finishing all wood — soft and hard. Considerable space is devoted exclusively to the finishing of manual training models. It's the work of experts—illustrated in color.

HOW TO GET IT FREE

Write us (mentioning the name of the firm from whom you buy paints, varnishes, etc., and we will gladly send you our book, "The Proper Treatment for Floors, Woodwork and Furniture" free and postpaid.

JOHNSON'S ARTISTIC WOOD FINISHES

Johnson's Artistic Wood Finishes are particularly adapted for manual training work as they may be applied by the youngest and most inexperienced pupils with good results. Johnson's Artistic Wood Finishes are standard for manual training—they are being used all over the United States and Canada for this purpose.

Our line of Artistic Wood Finishes is complete—it includes —

Johnson's Prepared Wax
Johnson's Wood Dye
Johnson's Crack Filler
Johnson's Paste Wood Filler
Johnson's Perfectone Undercoat
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Johnson's Electric Solvo
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You will find this entire line described in our book. Any time specific information is desired, or whenever you want specially finished wood panels, do not hesitate to write us. We solicit correspondence with Manual Training Instructors.

Mail attached coupon for this authoritative book on Wood Finishing.

S. C. JOHNSON & SON, **RACINE, WIS.**
"THE WOOD FINISHING AUTHORITIES"
(Canadian Factory—Brantford)

S. C. JOHNSON & SON,

Racine, Wis., Dept. I.A.10 (Canadian Factory—Brantford):

Please send me free and postpaid your authoritative book on Artistic Wood Finishes for use in manual training work.

The best dealer in paints here is.....

My Name .....

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City and State.....

Adjustable Hack-Saw Frame with pistol grip No. 247—Price $3.60

Mr. Punch says:
"Give a student this hack-saw and see how it helps him turn out good work."

An easy-to-use Hack-saw for school use

THE pistol grip handle fits snugly in the hand and is so hung that the wrist comes almost directly behind the blade.

Made of first-grade, round-edge steel. Frame is adjustable from 8 to 12 inches. Very rigid, being made of ¼ x ¾ inch steel with extra-heavy back. Depth of throat 3⅛ inches. One blade furnished with each frame.

As to blades, the Goodell-Pratt line offers a wide assortment of all-hard as well as flexible blades. The all-hard blades are made of high-grade hot-rolled sheet steel, hardened and tempered. The flexible blades are made of the same grade of sheet steel, with hardened teeth and back, but with soft centers to withstand severe twists and side strains.

Other Goodell-Pratt Tools

You will find in the Goodell-Pratt Catalog No. 15, many tools that should be a part of your school equipment. The catalog is free. Send for it.

GOODELL-PRATT COMPANY, Greenfield, Mass., U. S. A.

Toolsmiths

GP 777 Flexible Hack-Saw Blades with soft center No. 777

GP 888 Hack-Saw Blades all hard No. 888

GOODELL-PRATT
1500 GOOD TOOLS

DON'T MAKE HIM GUESS

There is no guessing when you use Morrill's Special Sawset. The anvil is beveled to give both the proper angle and depth of set to any hand saw not over 16 gauge. All that is necessary is to set the number on the anvil corresponding to the number of saw tooth points to the inch of the saw to the arrow, run up the gauge screw until the saw just goes through easily, lock it and proceed to set the saw.

"Saw Points," a booklet on "How to Joint, Set and File Saws," and used by many Manual Training Teachers as a Text Book, will be sent free to any teacher upon request.

Our name Morrill and trade mark is stamped on every tool of our manufacture.

CHAS. MORRILL

94 La Fayette St. New York, N. Y.

MAYDOLE HAMMERS
THE WORLD'S STANDARD

There are none better made—none better known. When you buy these hammers, you are certain of getting the best. They are used the world over.

Maydole Hammers are made of finest quality material, and guaranteed first-class in every respect.

Write for our booklet of useful information, which every student should have. How many shall we send?

The David Maydole Hammer Company

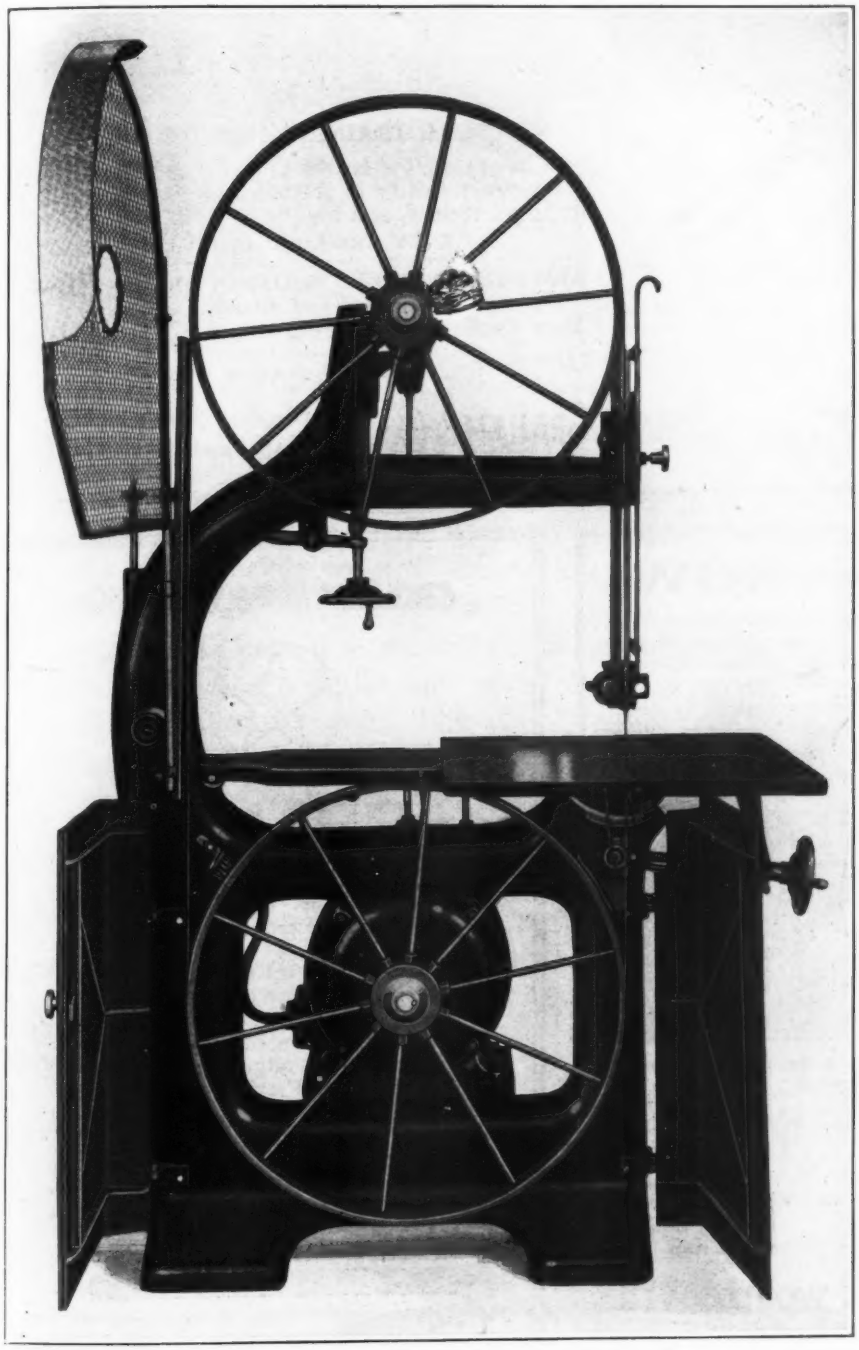
NORWICH NEW YORK U. S. A.

Protection, plus Accuracy

—and a self-contained Direct Motor Drive

Exclusive features with

Famous Motor Driven Band Saws



No belts, — no chains, and no flexible coupling! Power is applied direct from motor with lower band saw wheel mounted direct on motor shaft. Not an ounce of lost motion. The moment you turn the switch, the machine is in full motion.

Then notice the protecting shield around upper band saw wheel, and the cast iron door guard below. They keep all moving parts completely encased.

And the machine is easy running, sturdily built, and free from vibration. These are only a few of the reasons why Famous Motor Driven Band Saws are so well adapted for use in Vocational Schools.

Send for complete bulletin on Sidney-Built Woodworking Machines for Manual Training Schools.

THE SIDNEY MACHINE TOOL CO.

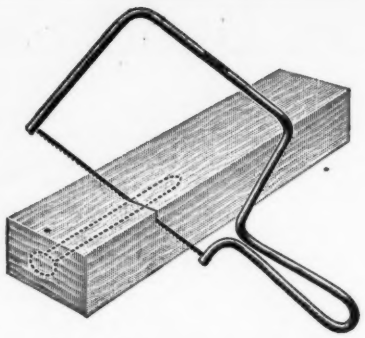
Dept. 410

Sidney, Ohio

Ask About Our Free Service for Vocational Schools

Our Engineering Department is equipped to give practical assistance in the designing and equipping of Vocational Training Schools. Complete details of this Service will gladly be furnished on request.

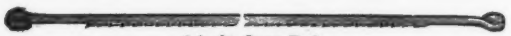
GRIFFIN
COPING SAW BLADES



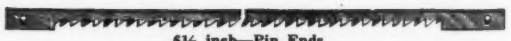
Will stand the most severe tests, even cutting right through nails imbedded in wood.

Every GRIFFIN BLADE is carefully hardened to give long service. The teeth have a distinct "set" for easy clearance, which prevents heating, binding and breakage.

HAVE SHARP TEETH and GOOD TEMPER



6 inch—Loop Ends



6½ inch—Pin Ends
Also furnished in 6 inch.

MANUAL TRAINING INSTRUCTORS

who have used the Griffin Coping Saw Blades for many years testify to their uniformly high quality, good temper, and well "set" teeth.

THEY ARE GOOD JUDGES

ALWAYS SPECIFY "GRIFFIN" Coping Saw Frames and Blades.
Your Dealer will supply you — if not, write us.

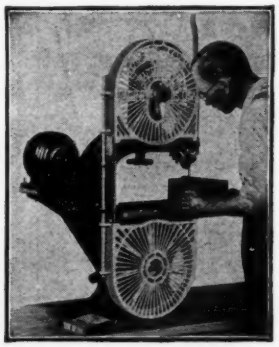
Sales Department

113 Chambers Street NEW YORK JOHN H. GRAHAM & CO. **268 Market Street San Francisco, Calif.**

Delivery NOW!

Changes in schedules — increased enrollment — extended courses—where unforeseen changes of this kind make it necessary to add to your tool equipment we can give you immediate delivery.

The RACINE DUPLEX



is especially suited for school use — cuts all materials —wood, soft metal or steel.

We have increased our stock of Racine Duplex Band Saws in anticipation of rush orders for this popular piece of manual training equipment. Descriptive circular and prices on request.

Use "Racine" H. S. Wood and Metal Band Saw Blades and "Racine" H. S. Tungsten Power and Hand Hack Saw Blades.

RACINE TOOL & MACHINE CO.
1403 JONES AVE.
Racine, Wisconsin, U. S. A.

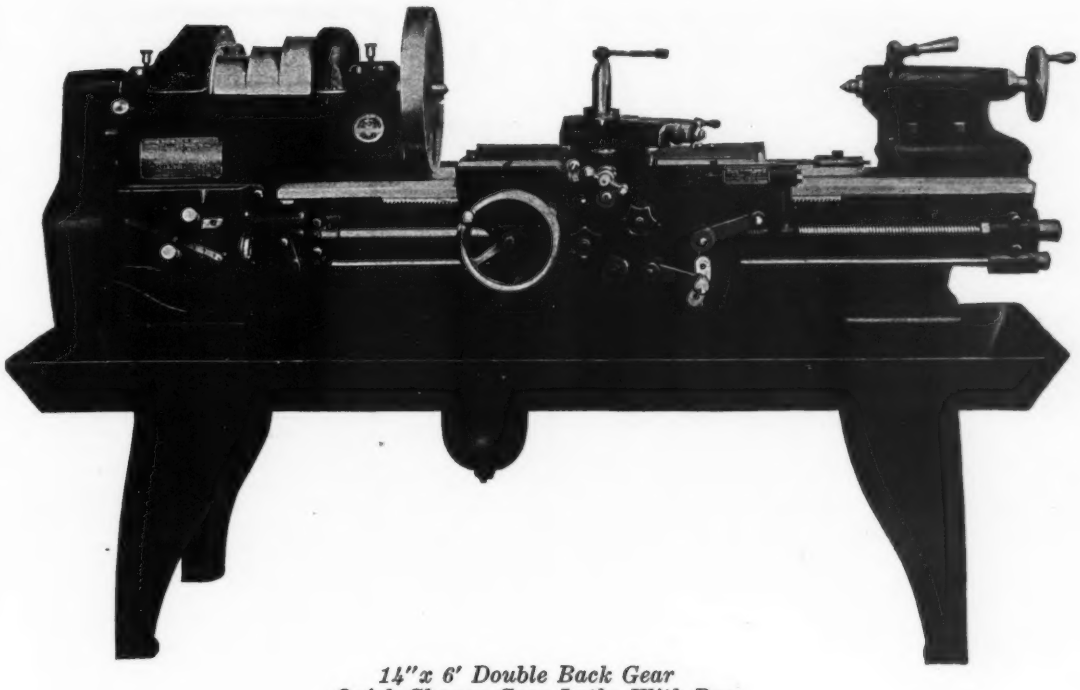
Manufacturers of the Famous Racine H. S. Metal Cutting Machines.

"STANDARD THE WORLD OVER"

"STAR"
Hack Saws

The Blade with a Reputation is built upon the metal cutting performance record of forty years. STARS cut faster and cut longer. Personal service, information, advice and price lists on all Hard and Flexible Hand Blades, and on Power Blades, sent on request.

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y.
Makers Since 1883



14"x 6' Double Back Gear
Quick Change Gear Lathe With Pan

More Monarch Lathes are being used in manufacturing plants throughout the country than any other make. More Monarch Lathes are being installed in Manual Training Departments of schools than any other make of lathe. The student, upon completion of his school work, will find himself coming in contact with Monarch Lathes in most shops.

Monarch Lathes are built in sizes ranging from 9 inch to 30 inch swing, and bed lengths from 2½′ to 30′.

Our Engineering Department will gladly submit plans and layouts for machine shop installations and we are in position to give Vocational Instructors valuable information and plans, for which no charge is made.

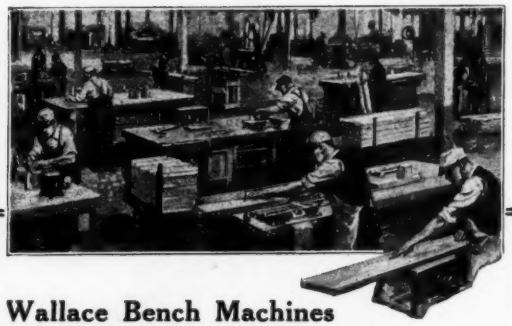
There is a Monarch Dealer near you, who will gladly show you the merits of Monarch Lathes.

Let us send you Special Vocational Bulletin.

THE MONARCH MACHINE TOOL CO.

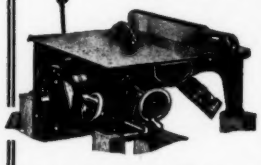
304 OAK STREET SIDNEY, OHIO

Largest builders of high grade engine lathes and specialist in lathes for Vocational Training.



Wallace Bench Machines for Manual Training Schools

The Wallace Bench Universal Saw



Wallace Bench Universal Saw
Wallace Bench Plain Saw
Wallace Bench 6" Jointer
Wallace Bench 4' Planer
Wallace Bench 16" Band Saw
Wallace Bench 6' Lathe
Wallace Bench Glue Pot with Automatic Heat Control
Wallace Bench Solder Pot with Automatic Heat Control

Practically 80% of all fitting, cutting, planing, and assembling in the average woodworking shop can be done more accurately and in less time on Wallace Bench Machines.

Follow the example of 500 other schools that have installed them. For extreme accuracy, speed, convenience and safety, Wallace Machines lead the world.

Send for descriptive bulletins.

J. D. Wallace & Co.
1415 W. Jackson Blvd.
Chicago, Ill.

Using the Right Ink

COOPERATING WITH SCHOOL PRINT SHOPS

The House of Friendly Service.

The kind of Printing Ink used largely determines the attractiveness of any piece of printed matter.

A knowledge of the different kinds of ink and their proper use is essential to complete printing instruction.

Our knowledge of printing inks and their proper use based on years of experience as manufacturers of a complete line of printing inks is freely offered to school print shops.

The general use and approval of American Printing Inks by the printing industry is evidence of their superiority for school print shops.

AMERICAN PRINTING INK CO.
2316 W. Kinzie St., Chicago, Illinois.

The Pioneer Of Them All And Still The Leader

Type D-1

15" Disc Sander

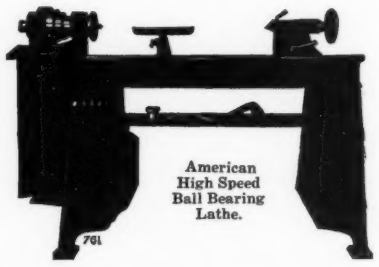
The machine that is considered to be the standard in every pattern shop.

For instruction purposes this machine is invaluable.

Write For Catalogue.

THE PORTER CABLE MACHINE CO.
1702 Salina St.
Syracuse, N. Y.

Careless Fingers!!



Even the slap-dash, careless fingered student is unusually safe when operating the AMERICAN HIGH-SPEED BALL BEARING LATHE. The motor, drive pulleys and belt are inclosed. All hand shifting is eliminated by a sure one handle belt control and shifting device. Quick-acting emergency brake on head stock. SAFETY is really "first" and simplicity of operation combined with ruggedness under exacting strains a close "second" in the design of this splendid machine. It is your duty to know more about it. Write us today for complete specifications.

The same service standards are found in AMERICAN saw benches, jointers, planers, band saws and wood-workers.

American Saw Mill Machinery Company
74 Main St. Hackettstown, N. J.

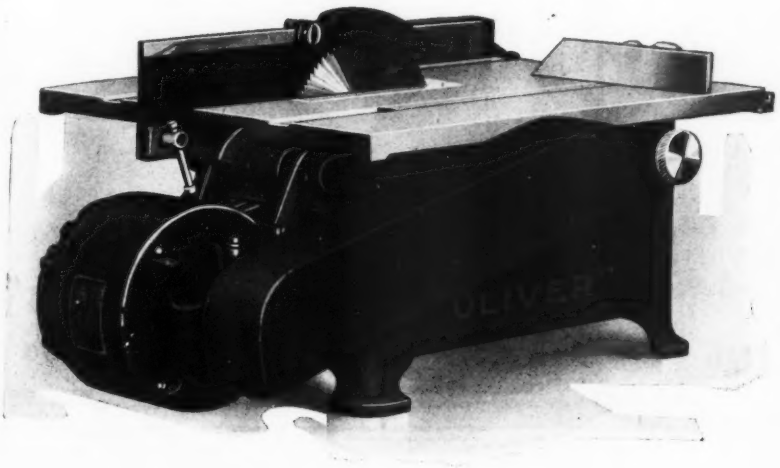
AMERICAN
MANUAL TRAINING EQUIPMENT

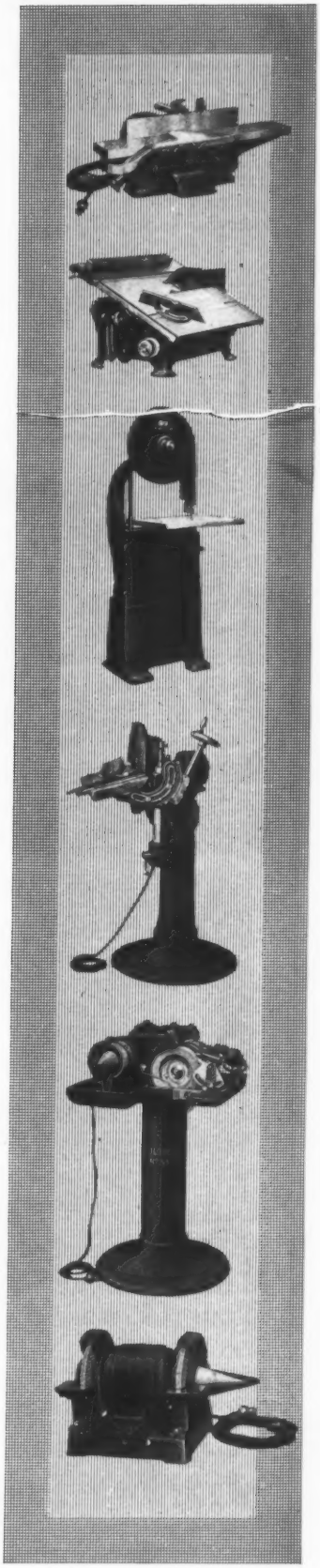
Your Copy

of the New Catalog

"Oliver" Portable Woodworking Machinery

is ready for you. Ask for it.





The "Oliver" No. 193—7-Inch Motor Driven Saw Bench

is a high grade Portable, Ball Bearing Machine. It operates from power or lighting lines. It has capacity to cut 2 inches deep with 7-inch diameter saw. Dado heads $\frac{3}{8}$-inch wide can be used. The machine is furnished with independent floor support when ordered. The cast iron table measures 21 x 24 inches; has removable metal throat piece; has grooves on either side of saw for cut-off gauges. A dial with graduations indicates exact position or tilt of table.

Regularly equipped with saw, sawguard, splitter-guard, double faced ripping gauge, one positive clamp cross cut gauge, belt, belt guard, motor switch. (For light socket attachment cord and plug also furnished.)

Oliver Machinery Co.

Grand Rapids, Mich., U. S. A.

Boston, Chicago, Cleveland, Detroit, Los Angeles
Minneapolis, New York, San Francisco, Seattle, St. Louis
FOREIGN AGENTS: Canadian Fairbanks Morse Co., Ltd., Canada.
Oliver Machinery Co., Ltd., Manchester, England.
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SEMI-STEEL CASTINGS

Parker Vises are cast in our own shops, a mixture of Bessemer Steel and Grey Iron, proved by 81 years of hard service in the big shops of the U. S. and Canada.

—and Steel-Ribbed Slides

A solid steel bar cast into the slide its full length just above the screw, provides overstrength to meet the over-enthusiasm of the husky student.

Send for Catalog No. 57-A and ask about Parker Vises for *your* work.

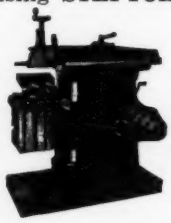
The Charles Parker Co.,
Master Vise Makers
Meriden, Conn., U. S. A.

PARKER VISES

SHAPERS MILLERS ENGINE LATHES

14"x6'—$450.00
16"x6'—$500.00
With Quick Change Gear Box
$85.00 extra

Moderate price machine tools — practically fool proof — ideally suited for school shops. Thousands in use all over the world giving daily satisfaction. Send for list of schools using STEPTOE equipment.



Descriptive catalogue and full particulars furnished upon request.

Industrial Education Department

THE JOHN STEPTOE CO.
CINCINNATI :: :: OHIO

DURABILITY — ACCURACY — STRENGTH

are striking features of

Westcott Chucks

Spur Geared Scroll Combination Lathe Chuck

They are as essential in the schoolroom as in the commercial shop. The student who learns his trade using the very best of tools and equipment, is sure to benefit in the end.

In the case of chucks—
BUY WESTCOTT

Mainly About Your Classes

Little Giant Double Grip Drill Chuck

If you are not using Westcott Chucks now, you should certainly give your boys this advantage. Their best work can only be accomplished on the best equipment. Specify Westcott Chucks on your next order—in the meantime send for our catalogue.

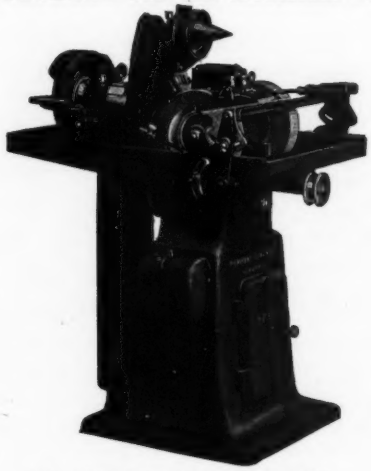
Manufacturers of chucks for every class of work

WESTCOTT CHUCK COMPANY
ONEIDA, NEW YORK

MUMMERT-DIXON OILSTONE GRINDERS

The Modern Edge Tool Sharpening Machines

THE STANDARD FOR ALL INDUSTRIAL SCHOOLS



No. 481—Motor or Countershaft Drive.

An automatic attachment for grinding long knives can be furnished with this machine.

THE FIVE LEADING FEATURES

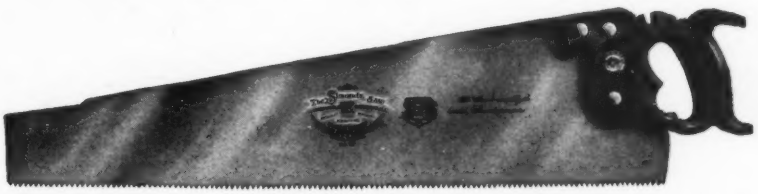
1. Coarse Oilstone Wheel
2. Fine Oilstone Wheel
3. Grinding Cone
4. Leather Wheel
5. Emery Wheel

ALL AT YOUR FINGERS' ENDS

Send for full descriptive bulletin

MUMMERT-DIXON CO.
Hanover, Pa.

The Best Saws For Manual Training or Vocational Schools



Any woodworking department that is equipped with SIMONDS SAWS—Hand, Circular or Band—has the best cutting service that can be obtained. These are edge-holding saws of the finest steel and workmanship. They cost no more than many inferior saws, and give many times the service. Consider SIMONDS when adding new saws to your department.

SIMONDS

Saw and Steel Company

FITCHBURG, MASS.
5 Factories

CHICAGO, ILL.,
12 Branches

V&B Braces

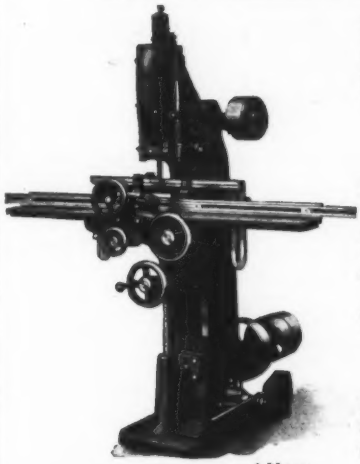
Do you have trouble with your end screw attachment? V & B Braces, with their patented key construction, make such troubles a thing of the past. A quality tool, of course!

VAUGHAN & BUSHNELL MANUFACTURING COMPANY
Makers of Fine Tools
2114 Carroll Ave. Chicago, Ill. U.S.A.

Established 1847 — Incorporated 1878

Woodworking Machinery

Improved Belt-Driven HOLLOW CHISEL MORTISER



The Annexed Cut shows the Improved Hollow Chisel

Mortiser,

as Belt-Driven, but it may be Motor-Driven, by a Motor on the lower shaft.

The **Compound Tilting Table** may be applied to any of the styles of machines.

Address

H. B. Smith Machine Co.

Smithville, N. J., U. S. A.

Or Nearest Branch
NEW YORK CHICAGO ATLANTA SAN FRANCISCO

Union Portable & Bench Machines

complete with individual motor and switch to start and stop are ideal manual training school equipment.

Universal Saw Bench

Safety provisions are taken care of to the limit

Any lighting circuit your power supply line

Portable Truck Type Pedestal illustrated, affords not only a convenient means of moving machines from place to place but an ideal base for the machine when in operation.

SEND FOR BULLETIN DESCRIBING UNION

Universal Saw Bench
Plain Saw Bench
Single Spindle Shaper
16" Band Saw
6" Jointer
4" Jointer
Combination Universal Saw Bench and 6" Jointer

The price is small enough so that it is not necessary to restrict this equipment.

GALLMEYER & LIVINGSTON CO.
388 Straight Ave., S. W.
GRAND RAPIDS, MICHIGAN

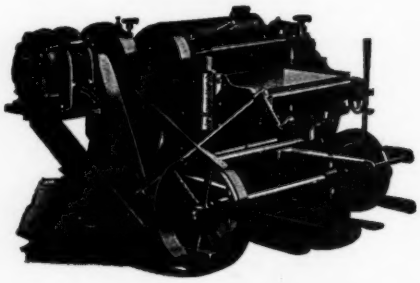
KEYSTONE

Guiding Youth's Grinding Propensities

When the shop student braves the world of practicalities he will find the work less strange if he has used the "Cleveland" Grindstones and Sterling Abrasives while in school.

For these are the grinding products that manufacturers use—in itself a convincing recommendation that you, too, should use them.

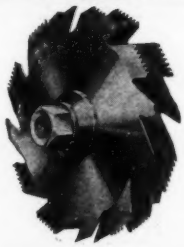
The Cleveland Stone Co.
1836 Euclid Ave. Cleveland, Ohio



CRESCENT WOOD WORKING MACHINERY in your wood working department will give the same satisfactory service that the machines are delivering in thousands of factories throughout the world.

Send today for catalog of band saws, saw tables, jointers, borers, disk grinders, planers and matchers, swing saws, cut off tables, shapers, mortisers, variety wood workers, universal wood workers.

The Crescent Machine Co.
25 Main Street
Leetonia, Ohio, U. S. A.



YOU NEED A HUTHER DADO HEAD

The saw that makes intricate cutting and grooving simple

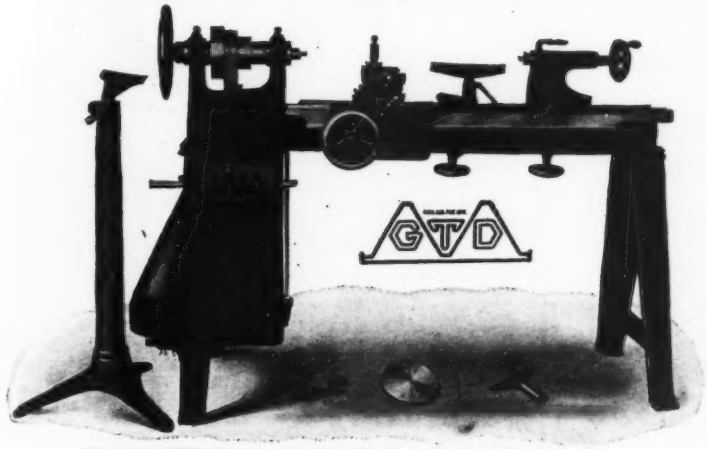
This saw, developed from our own patents, consists of two outside cutters and a sufficient quantity of inside ones to perform the required cut. The outside cutters can be used singly or in pairs as required.

Every builder or contractor, wishing lock corners or any sort of grooving, will find his production costs lowered by this saw.

Write for complete information and prices, or send for one on approval. It may be returned at our expense if unsatisfactory.

HUTHER BROS. SAW MFG. CO.
Rochester, N. Y.

A Lathe that will "Stand The Gaff"



No. 218 GTD Demonstration Lathe—for wood or steel.

Here is a lathe that is designed especially for standing up and delivering the goods under extra hard treatment—designed that way because we know that inexperienced operators, in spite of the best intentions, are hard on machines.

They can't injure the GTD lathe. It's guaranteed to render service under the most exacting conditions. Moreover the prospective user has the option of several different models, so that the selection of one suited to his own particular needs should be very easy.

Our Machine Tool Department will be glad to help in any way possible.

If you are in any way interested or responsible for the purchase of vocational equipment, or the greater success of vocational classes, write NOW for complete information on lathes.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS

THE JOHNSON FRICTION CLUTCH

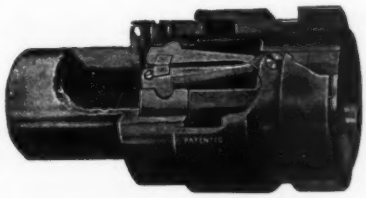
Friction Clutches from Stock

For Use in the Manual Training Departments of Technical High Schools and Universities

Friction Control Means Better Machinery

And the Johnson Clutch is supreme among friction clutches. Adopt it as your standard—always dependable and always promptly obtained.

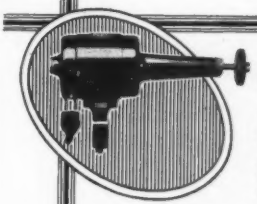
Complete engineering service to consult on your problems and to handle special installations of any kind.



Single Clutch Broken Away

Write for Catalog "IAM"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

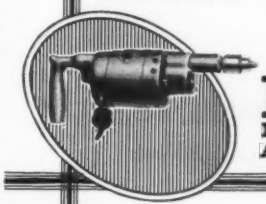


No. 1-JG Grinder

Pivots to any angle. Dynamically balanced, universal motor, operating equally well on A.C. or D.C.

No. 1-BD Hand Drill

Length 12½". Capacity—steel, ¼". Motor, dynamically balanced, operating on either A.C. or D.C.



GREAT savers of time and labor—easy to handle—simple to operate—these two light weight tools can easily be carried about from job to job. With tools like these in the school workshop, production assignment schedules can readily be lengthened and made almost unlimited in variety.

The many DUMORE grinders and drills now in active service—the numerous re-orders we receive from satisfied users—the favor shown these tools by leading vocational experts, *all* are tributes to their efficient, accurate performance.

The DUMORE grinder and drill shown here will meet your requirements just as satisfactorily as they have met the needs of other successful instructors. Moderately priced, widely adaptable and exceptionally faithful in their service, they will prove a most valuable addition to your equipment. It will be to your advantage to learn how these splendid tools can be utilized in achieving greater successes. We'll be glad to explain. Write!

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HIGH SPEED GRINDERS AND PORTABLE DRILLS

Speed—Economy—Durability

JOHNSON No. 300 Melting Furnace

The most efficient, durable and economical Melting Furnace made. It is as rapid as any air blast outfit and less trouble to operate.

REQUIRES NO FORCED AIR BLAST

Fitted with a cast iron removable Pot which has a capacity of 150 lbs. of metal.

Gas consumption only 40 cu. ft. per hour.

Height 28 inches.

Weight 100 lbs.

Write for our complete descriptive catalog of Industrial Gas Appliances.

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Standard Carriage Clamp—Sizes 2½" to 12"

Perfection Steel Bar Clamp—Sizes 2' to 10'

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We manufacture a complete and up-to-date line of Clamps, ranging in size from 1 in. to 10 ft. opening, also many other improved mechanics' tools which should interest you. Write for our new catalog.

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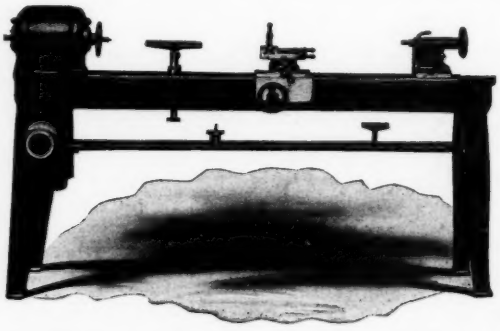

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These are the highest development in Manual Training School Equipment. We build lathes of this type suitable for either direct or alternating current. Motors are ball bearing and have convenient speed regulating dials and snap switches. Convenient to operate and every provision made to guard against injury to operator or motor.

We build a complete line of Manual Training Equipment and have a special catalog which will be sent on request.

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MANUAL AND VOCATIONAL TRAINING

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NEW YORK, Since 1848 4th Ave. and 13th St.

Do You Sand Work Like This in Your School Shop?

This illustrates a portion of the many shapes which can be belt-sanded to advantage on the Mattison Hand Block Sander. Every woodworking establishment of any size operates at least one hand block sander.

Familiarize your students with belt sanding machine methods as they actually exist in the factories by having them use a Mattison hand-block sander for finishing large flat surfaces and moulded shapes, as well as small pieces and built up cases.

Send for Buletin No. 138-B showing dozens of interesting operations

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and you overlook one of the best courses for Manual Training Workshops

A large number of the foremost schools in the country (public and private) have come to realize this fact and are teaching ***Sheet Metal Working*** in their Manual Training Department. They realize sheet metal is rapidly taking the place of wood in most every industry and mechanics knowing this trade are in great demand.

The work is healthful, the hours short, and pay ranks high among the best paid trades.

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At least send for literature on the subject.

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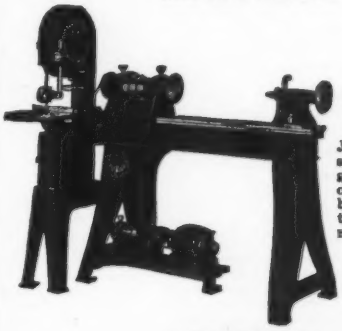
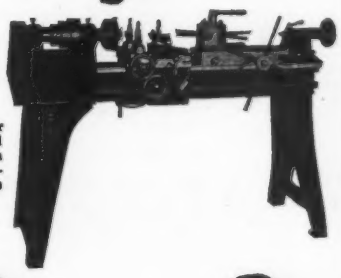
MANUAL TRAINING DEPARTMENT SPECIAL EQUIPMENT

Head Stock Motor Lathe



Combination Wood Lathe and Band Saw.

Jointer, planer, jig-saw, sander, buffer, grinder, mortiser and other equipment can be furnished and attached in a similar manner.

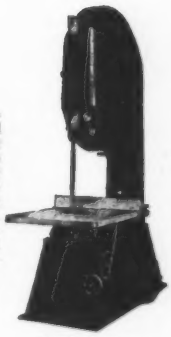


Metal Lathe—Motor or Belt Driven.

Miller, planer, gear cutter, grinder and other equipment can be furnished and attached the same as with wood lathe.

Power Hammer—Motor or Belt Driven.

All Little Giant Wood and Metal Working Equipment is sold on 30 days' trial, and guaranteed FOREVER against defective material and workmanship.



Band Saw—Motor or Belt Driven.

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Established 1876

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The rate for classified advertisements is $.07 per word per insertion, payable in advance. All wants subject to approval. Minimum 25 words. Forms close on 5th of the month preceding date of issue. Write for discount on yearly insertions.

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Basketry Materials—We have everything for basket making, including reeds, willow, chair-cane, Indian splints, ash splints and wooden bases. Send Fifteen Cents for Samples, 65-page Catalogue and directions. This contains illustrations of over 500 baskets, trays, frames, etc., with suggestions as to making them. Lewis Stoughton Drake, Inc., 33 Everett St., Allston, Boston 34, Mass.

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Want Good Electrical Projects? Build PEPCO Hot Pads or Toasters. Neat, simple, rugged, economical, satisfactory. We furnish instructions and parts. Service if desired. Address "PEPCO," Highland Park, Illinois.

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Judson T. Webb, formerly instructor in pottery at the Art Institute of Chicago, has located his laboratory and pottery supply business at 1710 W. 99th St., Chicago, Ill., Beverly Hills. He is prepared to furnish his glazes and colors, also clay, pottery tools and his potter's wheel. Send for new circulars. Judson T. Webb, 1710 W. 99th St., Chicago, Ill., Beverly Hills.

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For quick results, write Classified Wants Department. Industrial-Arts Magazine, Milwaukee, Wis.

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Build a genuine Choraleon Phonograph and save one-half. We furnish motors, tonearms, blue prints, instructions and parts. Send for catalogue and free blue print offer. Also full line Radio supplies, Radio cabinets. Veneer stock. Choraleon Phonograph & Radio Co., 923—20th St., Elkhart, Ind.

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Machine Shop Instructor is open for position. Buffalo Normal School graduate, June, 1923, fully prepared to teach machine shop practice, related technical subjects, mechanical drawing and forge work. Nine years' practical experience. Good technical education. Seeks a position where ability can be used to advantage. Address M-4, Industrial-Arts Magazine, Milwaukee, Wis.

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Leathers and Imitations	Wood Shades for Reading Lamps
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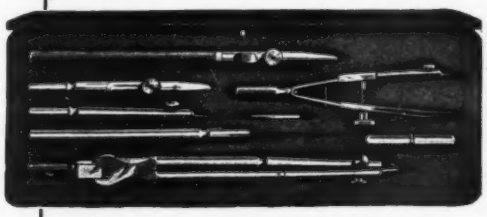

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Cosmos Instruments will keep everyone at his own desk. They are built right, and their perfect performance is but a reflection of the care and skill incorporated in their designing and construction.

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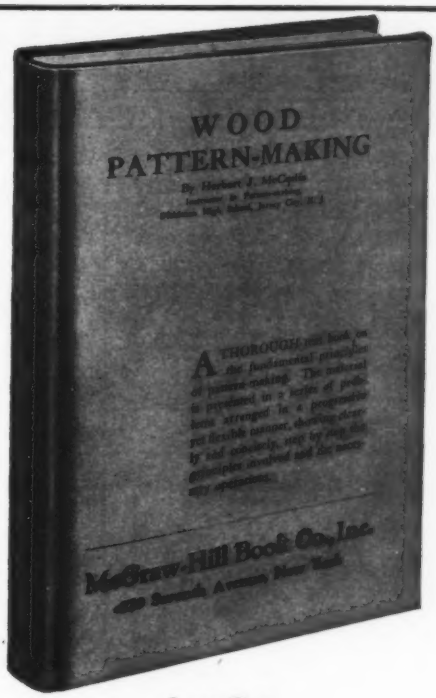
WEBER DRAWING MATERIALS
Everything for the Drawing Room.



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296 pages, 5 x 8, 333 illustrations, $2.25

A series of problems, arranged in a progressive yet flexible manner, presenting the underlying principles of pattern-making.

In each exercise an explanation of the nature and requirements of the casting and molding of the pattern is given, and this is followed by step by step instructions on making the pattern.

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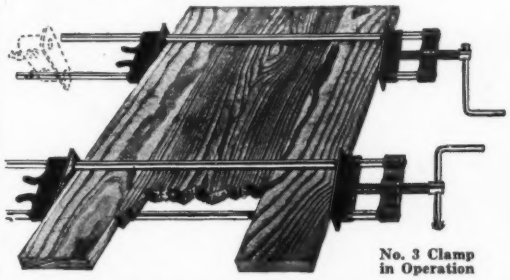

No. 3 Clamp in Operation

HARTFORD No. 6 Double Bar Clamps are also used extensively as presses—for veneering, gluing posts, chair arms, etc. The cost, however, is much less and the saving worth your consideration. Your first order will be followed by others on the basis of performance.

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HARTFORD CLAMP CO.

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Drawing Instruments
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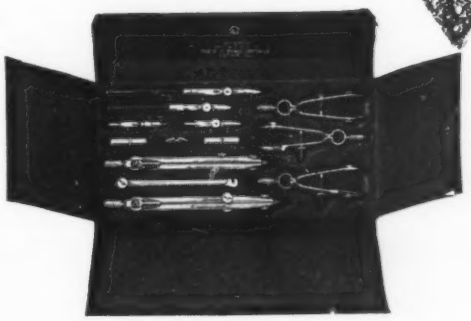

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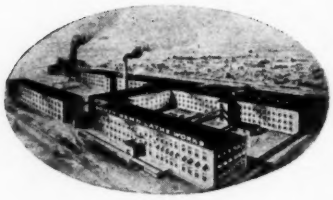

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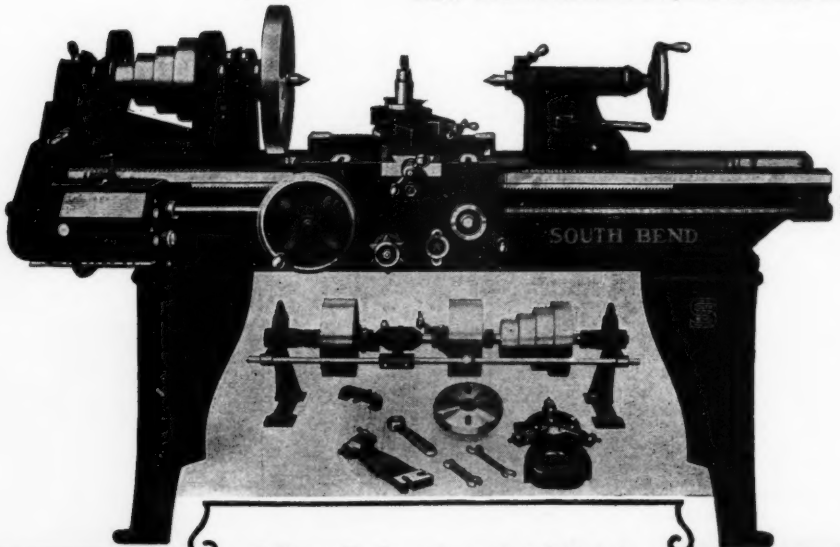

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INDUSTRIAL-ARTS MAGAZINE

Volume XII OCTOBER, 1923 No. 10

The Duties and Responsibilities of the Manual Arts Supervisor

S. Lewis Land, B. S., Director of Manual Arts, Tennessee Polytechnic Institute.

THE purpose of this paper is to set forth briefly and concisely, the need and reasons for, as well as the duties and responsibilities of, the supervisor of the manual and industrial arts. It is an attempt at a concrete and specific discussion of the topic. Not all the aspects of supervision are discussed in the paper, but only those which, from the writer's point of view, are most important to the manual-arts supervisor. No detailed discussion is here attempted at methods of procedure.

The subject will be discussed under four headings:

1. The need and reasons for supervision.

II. The supervisor as an executive.

III. The supervisor as an organizer and an administrator.

IV. The professional relations of the supervisor.

I. The Need and Reasons for Supervision.

A logical discussion of the duties and responsibilities of the manual-arts supervisor, necessitates an appreciation of the need and reasons for such supervision. No progressive work can be accomplished in the field of supervision, unless there is something to specifically accomplish—an aim, a goal to which to work. It follows that the duties and responsibilities of the manual-arts supervisor, and his professional relationship will depend on the need and reasons for supervision.

These may be stated as follows:

1. *The improvement of teaching.* A crying need in our school system today is that of teacher improvement. Teachers of the manual-arts continually come up against problems of method in classroom and shop, problems of classroom management, classroom procedure, and discipline. The assistance of a manual-arts supervisor is necessary in the solution of these problems.

2. *Selection and organization of subject matter.* The task of organizing subject matter for a course in manual-arts is a very important one. It is a task which the ordinary teacher of the manual-arts is not capable of handling.

3. *Testing and measuring progress of pupils.* There is such a wide variation in the decisions of various teachers in interpreting abilities of pupils, that some standard means of measuring this ability is necessary.

4. *Securing systematic organization.* There is not sufficient contact between the superintendent or head of an institution, and individual teachers. The supervisor is necessary to form a connecting link between the administrative machinery and the classroom machinery.

5. *Securing economy.* Equipment and supplies must be bought for the use of the students in the various manual-arts courses. In order to secure and maintain economy in expenditure, and efficiency in purchasing equipment and supplies, the responsibility should be placed on some individual.

II. The Manual Arts Supervisor as an Executive.

1. *Teachers' meetings.* One of the best methods of improving teachers in service is through teachers' meetings. However, if great care is not exercised in the organization and carrying on of these meetings, not only will there be a failure as to the results to be obtained, but there will be created in the teacher a bad attitude toward these meetings. Precaution must be taken in order not to make these meetings dull, routine affairs, without any purpose or end in view. If these meetings are conducted properly, the best results may be secured. The topic to be discussed should be a live, pertinent topic, relating to the manual-arts work, and one in which all the teachers are interested. Copies of the topic, or briefs, should be mailed out to the teachers a few days in advance of the meeting, in order to obtain thoughtful reaction on the part of the teacher. Provision should be made for expression from each individual teacher after the topic has been presented. The supervisor or person who has charge of the meeting should have a thorough grasp of the subject, in order to present it in the most effective way. These meetings may be held for the purpose of giving instructions as to plans and policies concerning the courses of study and work to be done, for the purpose of constructive criticism, new phases of work to be attempted, reports on national or state conventions attended by the supervisor or teachers, and for the purpose of discussing methods of teaching. Such a meeting might also be held for the purpose of preparing plans for an exhibit

to display the work of the department. In no case should there be held a meeting when there is no definite aim for it. The meeting should never be allowed to degenerate into an aimless discussion. Meetings should not be used for routine purposes, that can be disposed of otherwise.

2. *Institutes.* The manual-arts supervisor has an opportunity in institutes which he should grasp. He should direct the programs, discussions, and activities of the manual-arts teachers in the institutes.

3. *Illustrative teaching.* One of the effective ways by which the quality and standards of teaching may be raised is through the observation and demonstration lesson. At convenient times the supervisor should arrange a period when all the teachers may come together to observe the presentation of a lesson, and afterward to discuss the presentation of this lesson in helpful constructive way. The supervisor may teach this lesson or it may be presented by one of the teachers. Often it is better that it be given by one of the teachers. The supervisor should know the fundamental principles of teaching as they relate to the subjects being taught under his supervison, but it is not necessary, neither is it expected that he know the subject matter necessary to teach these various subjects. A knowledge of a number of these subjects is however desirable.

4. *Visitation.* The supervisor should make frequent visits to the classrooms and shops, for the purpose of inspection and supervision. He need not have a definite schedule which he follows in making these visits. He can better judge the quality of teaching being done, and more intelligently make suggestions for improvement, if the teacher does not know he is coming. If the proper relationship and feeling has been established between the teacher and supervisor, no embarrassment will result from unexpected visits.

It should be made possible for teachers to visit other schools and other classes, to observe what various teachers are doing.

5. *Conferences.* The supervisor should arrange to have at times convenient to the teacher, individual conferences for the purpose of giving helpful suggestion and constructive criticism. At these meetings there should be a free discussion between the teacher and supervisor. The basis for these discussions may be points noted by the supervisor in his visits, or there may be topics which the teacher has in mind, concerning his individual work, which he cares to discuss with the supervisor.

6. *Test and measurement of pupil attainment.* In the beginning it was pointed out that one of the needs of supervision was that of forming some standards by which to rate pupil attainment. It was pointed out that there is a wide variation in the judgment of various teachers as to the ability of the same student. Since this is true, and as this is the basis on which promotions are made, and many other matters of even greater importance are decided, some standard should be worked out by the supervisor, for this purpose. Little as yet has been done in the manual-arts field in this line of work. But it is a matter of great importance, and it affords manual-arts supervisors an ample opportunity to make a real contribution to the profession.

7. *Rating of teachers.* Just as the supervisor should work out a standard by which to rate the pupils being taught under his supervision, so should he work out some standard by which to rate his teachers. The primary purpose of this should be to stimulate the teacher to improvement, rather than to use it as a means of determining the qualities of the teacher in making recommendations as to salary, promotions, and so forth. The teachers should know the points on which they are to be rated, in order that they may have a definite aim in improvement.

8. *Rating supervision.* Just as the supervisor rates the attainment of the pupils being taught under his supervision, and the efficiency of his teachers, so should he rate the quality and efficiency of his own work. By referring to his records of teachers' meetings, visitations, conferences, rating of pupils, and ratings of teachers, he should be able to judge as to the efficiency of his own work, by noting the successes and failures of the past.

III. The Supervisor as an Organizer.

As an organizer, the supervisor performs those duties which, while not relating to the actual classroom supervision, are vitally important in his work—those duties which an administrator would perform in a system without a supervisor, to the neglect of the other important duties just discussed.

1. *Course of study.* The manual-arts supervisor usually has the privilege of organizing his own course of study. Sometimes, however, he does not have the entire responsibility of making up the course of study. If the course has already been mapped out by the state department, or the head of the institution in which the supervisor works, then he still is charged with the responsibility, and has the opportunity to adapt the course to the community, and to the students who are being taught under his supervision.

It would probably be impossible to set up here a criteria by which courses of study are to be formed. Different schools and different localities demand different and various subject matter. The supervisor should have a thorough knowledge of the needs of the students being taught under his supervision, and should have an adequate knowledge of the various kinds of subject matter that may best be adapted to these needs. He must have an understanding of the capabilities and limitations of the students, and the possibilities of their carrying the work out in the time allowed for it. He should be able to adapt the subject matter to the pupils as far as possible. The subject matter in all cases in the manual-arts should approximate life as near as the school situation will permit. The supervisor should

at all times be open to constructive criticism and advice from his teachers and from experts in the line of curriculum building.

2. *Office records.* The office of the supervisor should be conducted in a business like way. Some standard system of filing should be adopted and records kept in an orderly, organized way. Organization and system prevents waste of time and promotes more efficient work. Some standard form should be made, and printed supplies kept filed in the office of the supervisor, for all items necessitating recording. Reports on students by teachers should be kept on some standard form, and filed in the office of the supervisor for ready reference. Records should be kept of the purchase and disbursements of supplies and equipment. There should be records of all teachers' meetings, visitations and consultations. Bibliographies of manual-arts books, magazines, and magazine articles should be filed. All letters with carbon copies of answers to them should be filed. Teachers should be supplied with requisition forms on which to requisition equipment and supplies. These should be made out in duplicate—one form to be retained by the teacher, the other to be filed in the office of the supervisor, after the material has been ordered.

This does not mean that these records should be kept by the supervisor himself. The system and organization should be in the hands of the supervisor, but there should be furnished an office clerk to do the detailed office work. It is imperative that the supervisor be relieved of the detailed office work. His time should be taken up with that more important work of actually supervising, of improving the efficiency of his teachers, and of the work they are doing.

3. *Budgets.* In any systematic organization there will be found a system of budgets. They are a necessity in a well organized institution. The treasurer of the school board or person or persons who have charge of the finances, should know the amount of expenditure necessary for the manual-arts as well as the other departments. The supervisor should know the amount of this appropriation for his department so that he can most effectively plan the year's work. The budget might include expenditures for salaries, equipments, supplies and incidentals. The competent, experienced supervisor can estimate fairly well the necessary expenditure based on these four items.

4. *Installation of new courses and new equipment.* As was stated in the discussion on course of study, the good supervisor will ever be ready to make needed changes in his courses, and to make additions necessary because of changing needs. It will also be necessary from time to time to replace old equipment with new. The supervisor cannot rely upon information given him by manufacturers and equipment houses. Before purchasing he should consult with the teacher in charge of the work, and with other individuals who because of their training or experience, know what equipment can most economically be purchased, for the greatest service.

IV. The Supervisor and His Professional Relationships.

The supervisors of the manual-arts as do the supervisors of the other special subjects, often allow their departments to become segregated from the rest of the school. It should not be. If the supervisor has the proper attitude and the right conception concerning the place of his work, he will make every effort to make his work a part of the entire system. He should secure the cooperation of the other supervisors, the special teachers, principal, regular teachers, pupils, board of education, and superintendent.

According to the late James P. Haney, "Cooperation or joint service, is an essential to all successful effort, made by any association or individuals. It means friendly aid between director and teachers, and between teachers in individual schools, and teachers in separate schools. Its principle is mutual help and mutual teaching. Each is to learn from every other. It puts each member of the group into possession of the successful methods and devices of all. It pools information and resources. It makes for joint pride and criticism. It constantly seeks means of doing together. It seeks continually to strengthen the hand of one teacher with the aid of another, and similarly to strengthen the work of one school with the aid of other schools."

Cooperation especially should exist between the superintendent and supervisor. They should be working toward the same end—that of better opportunity for the child through improved teaching on the part of the teacher.

Not only should the supervisor secure the cooperation of, and work in harmony with these inside agencies, but the manual-arts supervisor should reach out and bring in outside agencies. Their assistance should be continually sought. It is the specific duty of the schools to educate future citizens, but these outside agencies must be made to feel that they are bound to aid in this obligation. The aid of various civic and social organizations should be enlisted.

Closely associated with the aid which may be secured through these various organizations, is that of the manufacturer. Much may result through cooperation with manufacturers. The manufacturer and business man may be invited to the school—the teacher with students may visit the shops, factories and manufacturing establishments. Through such contact, the schools receive the friendly aid and criticism of the manufacturer, and the service rendered by the school becomes known to those who are in position to employ its graduates. These results are worth while.

This is an industrial age, and boys and girls must be trained in the industries. Schools must be established for this training, and trade opportunities must be opened to the boy after he is trained. All this means the education of the business man and the manufacturer,

for without their cooperation, no successful manual-arts movement can be put over.

Then the supervisor must sell the manual-arts idea to the people. He must convince the people that industrial arts for an industrial people is not a luxury but an economic necessity. Every supervisor is therefore, "under obligation to become a propagandist for the cause, and an aid in enlightening the public, through the press, through articles, through discussion, addresses, and continued demonstration of practical work."

"We are teachers of teachers, and teachers of a greater public extending far beyond our ken. To perform this larger service as best we can perform it should be a matter of continued gratification and pride."

Brush Making in the Elementary Grade Shop

A. E. Gray, Instructor, South Park Avenue School, Warren, Ohio.

BRUSHES are of very ancient origin, for they are mentioned in the writings of Homer, who probably lived about a thousand years before the birth of Christ. I think they are of even greater antiquity, dating back to the Garden of Eden, where Adam with a brush of twigs (or was it Eve) swept a path to the spring. But some of the oldest things are the best, and many of our "modern" ideas in pedagogy, philosophy, and science are old as the hills, dressed up in a new phraseology and given to a thoughtless world as new and original.

Brushes are implements used for two distinct purposes: (1) The sweeping away of dust and dirt, and (2) the laying on of liquids in thin layers, as in painting. They are made of many kinds of material to suit many purposes for which they are used. Some of these are bristles, rice root, bass, Tampico, Jaumave, palma fibre, bristle fibre or coir (coconut husk), broom corn, rushes, rattan (split) bamboo fibre, oiled kitool (a wood fibre), rubber, wire of brass, steel and German silver; the hair of camel, cow, horse, goat, squirrel, bear and sable; feathers, and whalebone.

Except in the largest plants, the brush making industry in our factories consists of assembling parts made elsewhere in specializing factories. The handles

FIG. 1. MAKING A TEMPLATE.

and blocks are made in one place and finished in another. Backs are glued, or moulded on with composition. Many brushes are made on the Woodbury machine, where they make a "trepanned" brush; the holes not being bored through the block, but only so deep that they meet other holes bored from the sides or ends. The great bulk of the work is still done by hand.

A few years ago such things as reed, fibre cord, hickory splints, rush, brush fibre and bristle were looked upon as novelties and innovations in the school shop and consequently were shunned by the more conservative teachers. But gradually this is passing and progressive teachers are willing to adopt any medium that can be used with wood, to arouse in the boy more interest in the shop and in his own efforts to create something useful and artistic.

Of course brush making has been, and is today common throughout our country in various special schools and institutions. But this very old art is comparatively new to the vast majority of our public school manual training courses. While it offers no panacea for all of our shop ills, yet I believe it can be used to advantage for short periods in the school year. By way of justification for this activity in the elementary school shop it has the following advantages: (1) it offers a variety of tool manipulations, (2) creates a new interest in the boy's shop and his efforts, (3) acquaints him with the commercial and industrial life around him, (4) provides an opportunity for financing the pupils shop course (5) widens his horizon, aids him in discriminating between the various household articles turned out in a never-ending stream by the countless machines in our factories.

The suggestions given below are intended for the teacher in the elementary school shop, and no special equipment is required other than that found in any moderately well equipped shop. All pictures, drawings, and instructions pertain to the making of shoe brushes and clothes brushes, as these are most popular with the boys and come within the scope of the grade boy's ability and the grade shop equipment. But as the principles of construction are the same for nearly all brushes, the course can be broadened to include a great variety of brushes, such as hand brushes, vegetable brushes, radiator brushes, and scrub brushes.

One of the first things to be considered is the selection of a proper design for the brush back or block. This, at first thought, seems a simple matter. But when one notes the great variety of sizes and shapes of the common commercial brushes to be had at the stores, then the matter of design becomes a problem. In deciding this matter, one must know the use to which the

brush will be put, whether for shoes, or big brother's hat brush, or mother's or sister's dressing table, or just a big "get-the-dust" brush for father, or grandfather.

The selection of suitable wood, does not involve the difficulties found in making scrub brushes, vegetable brushes and clothes brushes, as these are most popular brushes, and those kinds to be used in water. Almost any kind of hard, close-grained wood is satisfactory, such as maple, walnut, cherry, oak or mahogany. The boys in our shop have managed to obtain good walnut and mahogany by collecting bits of boards salvaged from dismantled store rooms, old counters, saloon fixtures, old furniture, and picture frames.

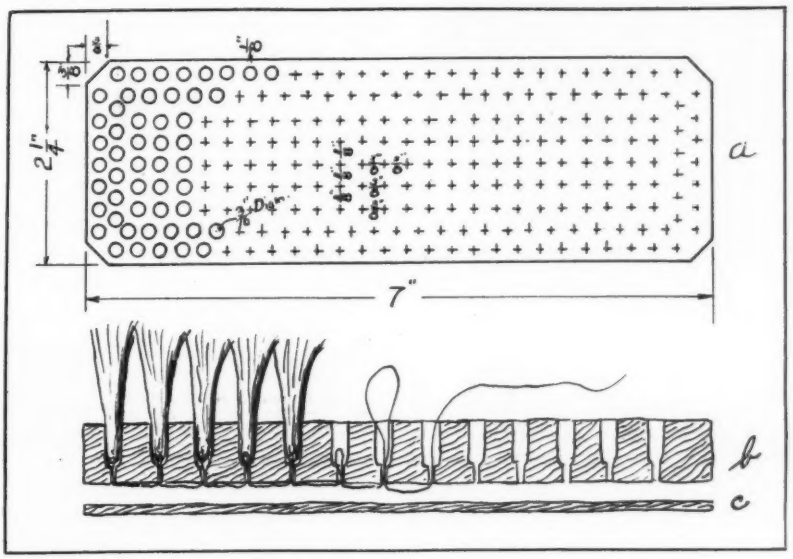


FIG. 2. A BRUSH PATTERN.

After deciding upon the style of block, next comes the making of the template or pattern, shown in Fig. 1. The drawing can be worked out in any junior or senior high-school drawing class and the design transferred by the shop class to the tin to be used for the template. Fig. 1 shows the method of using the template. Care should be taken that repeated use of the template does not enlarge the holes, thus causing the holes to be bored in the block in an irregular way. It is especially important that the outside row of holes around the block be particularly straight and uniform.

The size of the holes for drawing the fibre will vary from 5/32" to ¼", depending upon the kind of brush, and should be bored as close together as the nature of the wood will permit. A sharp bit should always be used, that the hole will be clean cut and accurate. As shown in Fig. 2b, two sizes of holes are bored in the block. The first larger and two thirds the way through, the second the rest of the way through and just large enough to allow the wire to be drawn freely. One difficulty encountered in boring by hand, is that of letting two or more holes run together. This causes two bunches of fibre to be drawn together, thus detracting from the appearance of the brush, especially if this happens in the outside row.

This can usually be avoided, if the proper spacing has been worked out for the particular kind of wood being used. It can be further avoided if the mark for boring be pricked rather deeply with a punch, which aids in keeping the bit from slipping from the mark.

Plate 3 shows the fibre being drawn. This offers no especial difficulty. After a few rows are drawn, the boy will learn quickly just about what quantity of hair or fibre can be drawn. This amount should be enough to completely fill the hole and yet not enough to cause the breaking of the wire in the drawing. One thing should be remembered from the beginning of drawing the fibre. One hand should be used for forcing the fibre or hair into the hole, and the worker should not depend upon pulling with the drawing wire, to get the fibre into place. The ideal drawing is done when the boy makes an entire brush without breaking the wire. When this is done there is no splicing of the wire with the attendant knot, making difficult the gluing on of the cover. Putting on the thin cover (Fig. 4, 2, c) can be made more satisfactory and easy if the block be grooved along the line of boring, thus providing for any knot in the wire and allowing the wire to be beneath the face of the wood.

The gluing of the thin cover over the drawing wire, though not a particularly difficult part of the work, is a very important part. This is especially true from the esthetic standpoint, as nothing detracts so much from the appearance of the finished brush as a poorly glued cover. Fig. 4 shows the most efficient way we have found, though others may find a better method and one that may prove more satisfactory. Everything con-

FIG. 3.

FIG. 5.

sidered, ordinary cold glue will give the best results and a better job of gluing can be done when the cover is at least 5/16″ thick when glued. After the glue has set, this can be planed, scraped, and sanded down to the desired thickness to give the brush a graceful appearance and to take the finish.

The most satisfactory brush material for work in the grade-school shop are Tampico fibre and horse hair. "Tampico" is a structural fibre produced from several species of small Mexican agaves. The plant grows wild from western Texas to New Mexico and southward. Centers of fibre industry are located in Coahuila, Neuvo Leon, and San Luis Potosi. In Mexico, tampico is used for cordage, saddle girths and sacks. It is derived from the central spike of unopened leaves. These are separated by hand and the leaves scraped on each side with a dull knife to release the fibre. After the filaments are thus obtained they are dried, bundled and transported by pack animals to neighboring towns where the material is baled, packed and shipped by rail to Tampico; hence the commercial name "Tampico."

This fibre can be purchased either white, black, red or mixed, in pound bundles ready to be cut to the required length for drawing. This together with black and white horse hair (mane and tail of horses and mules) is all that is needed to make excellent brushes, of many varieties. For clothes brushes a center of black tampico, either black or white horse hair, plain or alternated in various ways, filling the outside rows, makes an excellent brush.

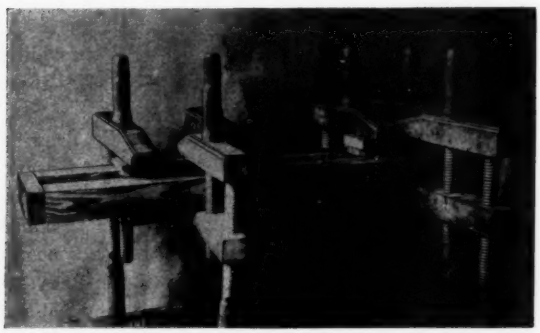


FIG. 4. A SIMPLE FRAME FOR GLUING COVERS ON BRUSHES.

The weaving of initials and designs gives variety to the work. For shoe brushes, horse hair trimmed to one inch length is best.

The hair and fibre come in lengths that can not be drawn without cutting. We have found in our shop that a pair of sharp tinner's snips are best for this. The fibre should be cut to about three or three and a quarter inches in length. After drawing, it must again be cut or trimmed to the length desired in the finished brush. The trimming which can also be done with the snips, requires more skill and care than any other operation in the construction of the brush. A machine trimmer is on the market for those desiring to make brushes on a more extensive scale. It will be found better to trim the fibre by rows, rather than wait till the entire brush is drawn.

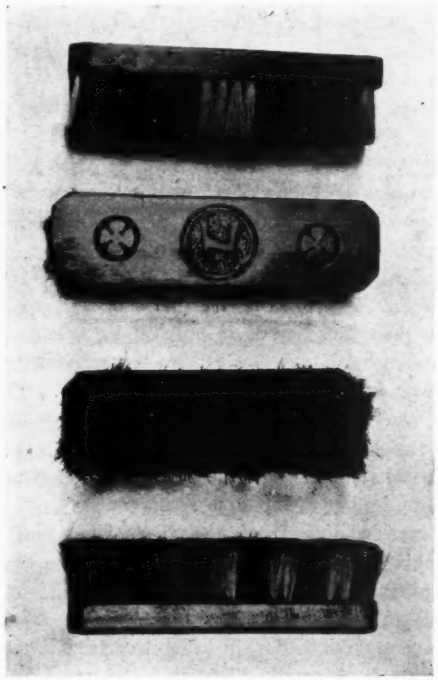


FIG. 6. A COLLECTION OF BRUSHES MADE IN THE AUTHOR'S CLASSES.

After the drawing, gluing, planing, scraping and sanding, comes another step which affords the boy an opportunity to make a thing of beauty as well as of practical value. It is that of carving designs, names, initials, and insignia, on the back of the brush. This can be as elaborate as the time, skill and desire of the boy permits. Certainly this should be encouraged, for many an embryo artist may be there in the class waiting for the encouragement and guidance of the teacher, and then too, "a thing of beauty is a joy forever," and a hand carved brush makes a very pleasing Christmas or birthday gift. The student who excels in this part of

the work will receive many orders from teachers and friends.

Any durable finish such as shellac, wax or varnish can be used. If a stain is used care must be taken not to allow any drawing until the under side of the block is stained. No finishing material of any kind should touch the fibre, especially the white horse hair, when used in the outer rows.

In the rural communities the boys should be encouraged to make brushes for caring for horses, ponies, dogs, and any of the live stock where special care is given in preparation for fairs, exhibits, etc., as this will lend an added interest and incentive. Brush making is an ideal home work, too, for no equipment is needed after the boring of the holes in the block, and the boy enjoys making them in the home workshop.

To those teachers who have never tried brush making, but who are desirous of giving it a trial in some of their classes, I would recommend that a small class be selected, say a group of sixth or seventh grade boys. The instructor should make one or two brushes to satisfy himself that he is familiar with all the steps and the most difficult parts of the construction. Then demonstrations, step by step are necessary; to create added interest, a short study of the history of brush making is desirable, or a trip to a brush factory, if available. Pictures and a collection of many kinds of brushes can be made. In correlation with geography, a study of the preparation of the fibre for the market can be made.

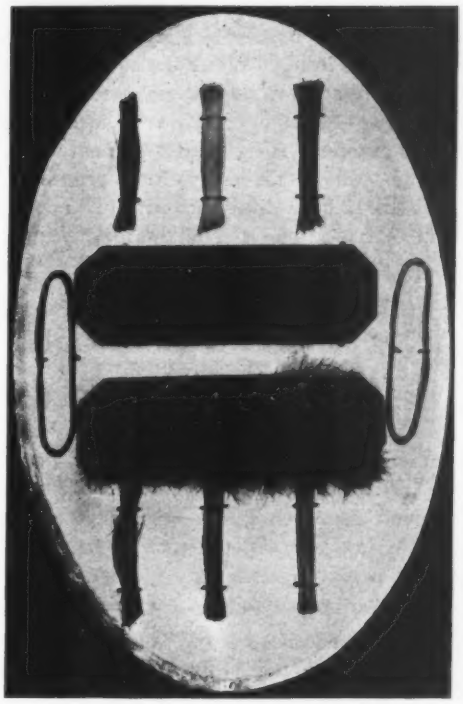


FIG. 7. BRUSH MAKING MATERIALS.

Finally in the English classes, many of the phases entering into the subject can be utilized to good advantage.

An Analysis of Typesetting

Frederick Ames Coates, Instructor in Worcester, Mass., Continuation School.

SYSTEMATIC, motivated instruction in the processes of the printing trade must seek its origin in days far antedating the advent of the school printing shop. Apprentice training has not always, and everywhere, been characterized by the haphazard method—or lack of method—which we are apt to associate with this moribund method of recruiting the industry.

Without holding that training by qualified teachers under school conditions and limitations is entirely more desirable than training by foremen in commercial plants, we may nevertheless admit that the advent of vocational courses into school curricula has had the result of crystallizing thought on the imparting of knowledge and skill as a problem per se, and of bringing the fruits of pedagogical experience to bear upon a problem which is after all essentially an educational one.

Foremost among these contributions is the realization that to teach a trade or a process one must analyze it into its elements. No teacher would present the binomial theorem to a class which had not mastered algebraic notation or the fundamental operations. But occasionally, it is to be feared, apprentices have been wastefully and painfully trained on jobs chosen for them because of the exigencies of the shop's work, rather than because such jobs fit into any progressive scheme of instruction.

Progressive instruction is not only the easiest method for both teacher and pupil, but it is likely to be far the most effective. From simple to complex, from easy to difficult, is an order which needs no defence; it is a fundamental of teaching. To put it into practice it is necessary only to analyze the trade operations, and arrange them in a suitably progressive order.

But when it comes to actual analysis and arrangement into such order, there is much still to be desired. A simple thing it seems; yet tradition has hampered us, has made our analysis superficial, has taken as a guide considerations of finished product rather than of actual difficulty of learning.

The setting of type well illustrates this. I do not here mean the designing and laying out of artistic jobs, the attainment of pleasing and harmonious combinations of type faces and sizes. It is a question to what extent, and with what success, these things can be taught, in a school or elsewhere. Many shops expect of

their journeymen little more than the ability to follow a lay-out previously prepared by a lay-out man or by the foreman. I have in mind rather the mechanics of composition; and in any printing course these must be uppermost during at least the first year of instruction.

I have examined many courses of instruction and teaching analyses of the composition process. They show remarkably little divergence save in completeness of detail. A typical one is as follows:

Straight composition.

Straight matter containing proper names, quotations, italics, etc.

Centered headings.

Various indentions.

Poetry.

Display composition.

Tabular work.

I submit that such a list—even when, as is often the case, display composition is subdivided into letterheads, title pages, handbills, etc.—is not a truly progressive analysis of composition.

In the process of setting type, the single line is the unit problem. For the beginner, engrossed in the physical difficulties of spacing and justification, to the exclusion of any artistic or other considerations, there are exactly as many kinds of composition as there are kinds of lines. "Straight matter" and "display" are mere names to him—names which do not even bear any real relation to the real problem.

With an exception noted below, there are just six kinds of lines which the compositor is called upon to set. They are:

1. *The Full Line.* This is most frequent in straight composition, where it includes all lines except those which begin or end paragraphs. It is also, however, very common in display work, in combination with centered lines. The full line is, of course, by its very nature a centered line; since its ends are equidistant from the center of the measure.

2. *The Indented Line.* All sorts of indentions, occurring at either end or at both ends of the line, present the same problem to the compositor; and this problem is not essentially different from that found in the full line. Knowing what the proper indention is—whether one em, two ems, or more—is not a composition problem at all, but a mere matter of information.

3. *The Blanked-Out Line.* This is found at the ends of most paragraphs in straight composition, and most lines of poetry are of this nature—whether or not they are also indented. But blanked-out lines are found also in job composition: a signature in a circular letter, for instance, is such a line, though the quadding comes at the left instead of at the right. The common type of news head, sometimes called the "step-down," consists of two blanked-out lines, flush at left and right respectively.

4. *The Centered Line.* This is the commonest type of line in ordinary display composition; but it is used also in book composition for chapter heads, subheads, etc. Running heads are practically centered lines, though the page folio takes the place of a quad at one end. The socalled "half diamond" or "inverted pyramid indention" is not properly an indention at all, but consists of centered lines. An indention, accurately speaking, implies a *predetermined* amount of space at the end.

5. *The Left-and-Right, or Center-Justified Line.* This is frequently used in job composition, alternating with centered lines. Without destroying the symmetry, it fixes the measure of a printed job in many places where the copy does not permit of a full line. A book's table of contents, however, is of such lines, even though the central portion is filled with leaders instead of quads. Financial statements and other pseudo-tabular jobs are set in this style.

6. *Tabular Lines.* The distinctive feature of tabular composition is the interrelation of its lines. Each must, in its parts, align perfectly with the others of the same table, in order to produce the vertical column effect. I have spoken of such a job as a financial statement as not being true tabular work. This is because the vertical alignment of its two columns is produced automatically by the boundaries of the composing stick; it presents no problem to the compositor other than does the center-spaced line. Tabular composition itself may be sub-divided into two classes. Columns composed of figures can be brought into alignment by mere counting of quads; columns of words, however, demand true justification to certain points determined either by a master-line or by a notched composing-rule. It will be noted that the common classification of tabular work according to the number of columns involved, is missing here. Number of columns creates no manipulative distinction, though it does affect speed of composition. There is no valid reason why instructors should borrow this distinction from the old price-and-a-half and double-price piece rates.

Here, then, are the six kinds into which all lines fall. The exception above mentioned I reserved for lines not set in a single body for a single impression. Lines beside initials or cuts, job capitals vertically justified with leads to produce cap-and-small-cap effects, skeletonized lines for color-work, I lump together here; though, if such lines are made the basis of instruction, their essentials should be carefully analyzed.

Now, we must arrive at a reasonable progressive order in which to teach our pupils the composition of the six sorts of lines; an order based strictly upon their relative difficulty. The placing of the types in the stick is identical for all; the variance in difficulty of these lines comes in the justification.

It is almost universal, I believe, to start pupils on straight composition: ordinary prose. Is this, in fact, the simplest, easiest kind? It is made up largely of full

apprenticed to his half-brother James, who was estab-

Some years earlier, Franklin had issued a pamphlet

signer of that famous instrument.

The Pageant of Industry

Mechanics Hall January 17, 1923

Massachusetts	Plymouth	Pilgrims	1620
Rhode Island	Providence	Baptists	1631
Connecticut	Hartford	Dutch	1633

FIG. 1. THE SIX KINDS OF TYPE LINES.
(Carets indicate places at which justification occurs.)

lines: lines which must be justified in several places—as many, less one, as the number of words. Accompanying this multiple justification must be a fine care for evenness of spacing. This is true also of the indented line at the beginning of a paragraph; indeed, a meticulous person might assert that an indented line is—so far as the setting of it is concerned—identical with a full line, thus reducing my list from six to five.

Is this, then, the easiest sort of line to set? Far from it! Instead, it falls little short of being the most difficult.

From the standpoint of simplicity of justification, look over the list. If we except tabular matter composed entirely of figures and quads—and from new, unworn type!—there is no line that can do with no justification whatever. What we want for our simplest line, then, is a line which demands justification in but one place. Such a line must obviate, too, any considerations of evenness of spacing.

Two of the lines listed above qualify thus as being of the simplest nature: the blanked-out line and the center-justified line. Why should it not be feasible to adopt as a first exercise for every pupil a job similar to the one shown in the illustration? This embodies both types of lines; the measure, the type, and the copy would of course be previously chosen by the instructor, to avoid any danger of run-over of lines, and the opposite danger of having the finished job appear too unbalanced. It will be noted that in the specimen I have selected blank verse, because it has no indentions; that the credit line is flush at the right, and that it is not set in italic. Neither indentions nor italics would make this exercise more difficult for the pupil, except insofar as the instructions concerning their use might divert his mind from the more important directions concerning justification. After this first job, however, poetry, whatever its indentions, might well be used for practice-work in composition, so much of which is necessary to fix the "lay of the case" in the beginner's mind.

Next in order of difficulty would come the centered line. This demands justification at two places, and also introduces to the pupil the conception of identical spacing which will later help him to form the habit of even spacing, as nearly identical as possible, in straight composition. Having mastered the centered line, the pupil, near the outset of his course, is already able to set almost any of the small jobs—tickets, letterheads, and the like—which drift into the shop, since these are almost exclusively composed of centered lines with an occasional center-justified line, also familiar to him. He should not, of course, be expected to plan and design such work; only to put it into type according to the instructor's specifications.

Full and indented-full lines would come third in the pupil's experience, instead of first. I would not separate them for instruction purposes, both because they occur together in plain prose compositon, and because from the standpoint of justification they are alike. The mere insertion of the quad for paragraph indention differentiates them less than ever if, as I have suggested, the pupil has already used indentions in poetry. He can thus devote a single-minded care to the justification and spacing which constitute the problems of this type of line.

I place tabular work last; not because it is always, or indeed usually, more difficult than straight composition, as I have already pointed out; but chiefly because it is of less importance in the average compositor's run of work; because, especially, in school work there is very little of it unless it is invented for instructional purposes.. Then, too, some tables—particularly those in which columns of uneven words must be aligned—do really present the acme of difficult justification.

We thus have arrived at the following progressive order for presenting the problems of typesetting to the pupil:

1, Left-and-right; 2, blanked-out; 3, centered; 4, indented full; 5, full; 6, tabular or vertically aligned. The more closely we can adhere to this arrangement, the more natural is each successive step bound to be to the pupil, and the more will his previous experiences be of benefit to him in solving his problem of the day.

The leaders of vocational education continually exhort us: "Use jobs of a commercial nature. Turn out stationery, handbills, office forms, tickets—anything. Don't give the pupil the idea that all printing consists of simple little jobs in a single face and size of type. Let the instructor dissect the job as much as necessary, lay it out, pick it into bits suitable for the various abilities and degrees of experience of his pupils; but let those pupils do the actual setting of the type, let them know that they are participating in the production of a real job."

The instructor can do this if, and only if, he knows how to dissect jobs, how to grade the bits into which he cuts them, to prepare them for assignment to the various members of his class.

That, after all, is not the least advantage of a proper analysis of the problems of composition, to an instructor of boys—or to a foreman over men.

Why Investigate and Analyze Local Occupations?

A. H. Edgerton, Teachers' College, New York City, Formerly
Supervisor of Vocational Information, Curricula, and Guidance, Detroit, Mich.

(Conclusion)

It is inevitable that the ultimate success of any democratic program of school instruction and counseling depends, to a large extent, upon the provision which has been made by the central office for collecting, evaluating, publishing, and using the factual material resulting from local and outside studies of important vocations, aside from the training and experience of those directly responsible. Furthermore, it is observed that these business-like contacts involving a scientific attitude toward problems of investigation and analysis in selected occupations, as well as the subsequent interpretation of these data in the light of school needs, have furnished those responsible for educational and vocational counseling, with valuable insight into present-day methods, conditions, and relationships in the different divisions of the workaday world.

Vocational and Educational Counseling. Intermediate Schools.

The demands which were primarily responsible for the development of intermediate or junior high schools in Detroit imply systematic counsel for each pupil throughout the seventh, eighth, and ninth grades. For this reason, one or more vocational counselors (see Diagram I) in each school are made sufficiently free from classroom teaching and disciplinary responsibility to interview boys and girls concerning the choice of their life work and the selection of courses in preparation for specific occupations. Not only do these full-time and part-time counselors consider it their duty to advise with pupils during their entire training period, but also to provide suitable educational and vocational facts for them.

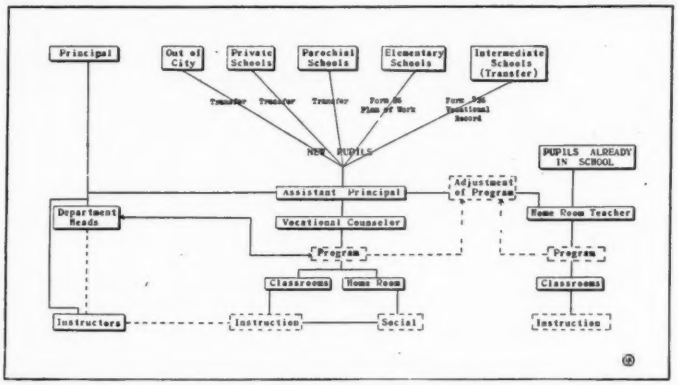


DIAGRAM I—SHOWING GENERAL ORGANIZATION AND PUPIL ROUTINE IN INTERMEDIATE SCHOOLS.

The initial group meetings and individual interviews which the counselors have with the seventh grade pupils entering these intermediate schools are concerned mainly with encouraging them to think more seriously regarding the problems of their life work. Since it is necessary at the end of this year for each pupil to choose between such courses as general, commercial, technical, and household arts, all of which have a score of studies in common, it is desirable to impress them with the importance of understanding the different types of occupational activity that these courses represent. If possible, all of the boys and girls are interviewed either individually or in small groups during the seventh year. At the outset, it sometimes proves more satisfactory for the school counselors to meet pupils in small groups because of the stimulation which usually comes from having those pupils who feel free to talk before the other members of the group, explain about some future plans which they have in mind. At any rate, pupils always are encouraged to consult with their vocational counselors whenever they have any questions or plans regarding either the selection of or preparation for life occupations.

As a result of the conferences and interviews during the seventh year, a part of the eighth and ninth years is devoted profitably to the adjustment of those who did not succeed in making, at least, tentative plans for their life pursuits. In addition to these individual conferences, relative to educational and occupational plans, group meetings are arranged to provide suitable talks for those who are beginning to ask questions and evidence special interest in the opportunities and requirements of certain divisions of the professional, the commercial, the industrial, the household, and even the agricultural vocations. Several of these conferences are made optional for those who have made tentative decisions and can benefit by talks from men and women that have succeeded in their respective callings. Of course, the ninth year emphasizes the advantages in making intelligent decisions and definite preparations for their chosen work, even more strongly than the pre-

vious years. Following the general try-out courses and occupational considerations in the seventh year, the eighth and ninth grade studies, interviews, conferences, and talks not only become more intensive but give increasing attention to the presentation of facts in keeping with the particular interests of the pupils. This usually is arranged with little administrative difficulty, since the pupils in these years are already grouped according to the courses which they are pursuing.

Although the school counselors are interested in all tests of general intelligence they desire to interpret the results of these tests as only one factor to be considered with other information resulting from pupils' performance inside and outside of school. All classroom and homeroom teachers, who naturally have intimate contact with their pupils, give valuable assistance in furthering the vocational and educational guidance program (1) by reporting upon individual pupils, (2) by imparting related occupational information, and (3) by showing the connection between these vocations (occupations and professions) and the respective subjects of instruction.

Continuation Schools.

Because the effectiveness of part-time instruction depends to a large extent upon the development of a suitable system of guidance and coördination, the counseling for part-time pupils is considered an indispensable part of the programs for both the boys' and girls' continuation schools. It is the duty of the vocational counselors to provide individual and group conferences for stimulating all pupils enrolled in these schools. These counselors for the junior workers are responsible for acquainting new pupils with the provisions of the compulsory attendance law as to school attendance, working permits, and junior employment service, as well as to assist them in making proper vocational choices. The coördinators, with the aid of the counselors, attempt to connect as closely as possible the activities of the school, the occupation, the home, and the community. The nature of the coördinators' positions allows them to assist the school officials and teachers in maintaining instruction which reflects the requirements made upon the junior wage-earners, and also to inform the employers of the educational opportunities which are and can be provided by the school system, with their coöperation.

The vocational counselors assign pupils to their school programs which are determined by both present employment and vocational choice; recommend necessary adjustments in pupils' school programs; suggest adjustments in employment to best serve the interests of individual pupils; impart vocational information to sponsors, teachers, and pupils; and recommend applicants for positions to be filled by the Employment Bureau. The school counselors also coöperate with the department responsible for issuing working permits to children who are leaving full-time school but are required by law to attend continuation classes for eight hours of each week. It likewise is an important part of the counselors' work to coöperate with this and all other agencies and school representatives who interview parents and children, investigate home and working conditions, and in any way pass upon the necessity for individual children to leave school during the compulsory attendance age.

High Schools.

The different types of high school organization in Detroit necessitate somewhat varied practice in school counseling. Diagram II shows the type of organization which, with slight modification, is to be found in a number of the largest high schools in the city. As indicated by this diagram, there is little fundamental distinction between the so-called house principalship and

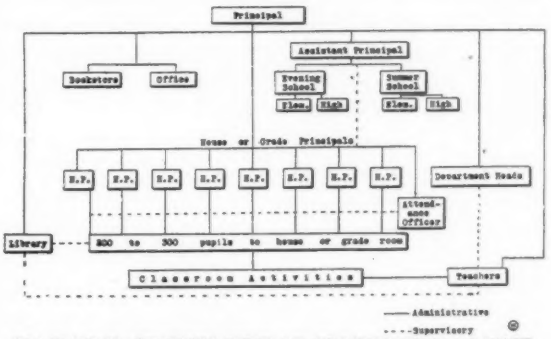


DIAGRAM II—SHOWING TYPE OF ORGANIZATION IN MOST DETROIT HIGH SCHOOLS.

the grade room organizations. In the former, students are assigned alphabetically to "houses" of from 200 to 300 students and up, and they ordinarily remain in these "houses" throughout their entire high school careers. The pupils are segregated on the basis of sex; boys and girls reporting to their respective "houses" for daily record and study during vacant periods, unless assigned to the library. Each house principal is responsible for pupils' programs, records, attendance, and for the establishment and maintenance of contact with parents. Since these house principals are responsible for educational and vocational counseling in their respective "houses," it often is found desirable to have all of them in one school act as a committee. The central office is in position to assist house principals through making available effective clearance facilities for information and for placement, and through sending to the "houses" specialists for individual or group conferences whenever there is need for such supplementary assistance. This ordinarily is the case during periods of course adjustment or immediately preceding part-time or full-time employment.

The grade room system represents a slight modification of the above plan, as students are assigned by grades rather than alphabetically and, in addition, there is no sex segregation. Much assistance is given pupils by the regular teachers, through the enrichment of their courses by including vital occupational information for supplementing the personal service rendered by grade-

room teachers. These school counselors or advisors are held responsible for all individual and group conferences which seem desirable from time to time.

A type of organization very different from either the house principalship or grade room plan is represented by the technical high school. The assignment of vocational counselors in this organization makes it possible to adjust students within the various departments of the entire school organization. The introduction of "group heads," who are charged with the responsibility for instructional provision to meet the needs of their respective groups, affords exceptional opportunity for the effective adjustment of students, both in the day and in the evening and senior continuation schools which operate as a unit organization. The assignment of students for instruction and adjustment takes place through group sponsors. In this connection, it should be understood that assignment of students for instruction in any group depends upon acceptance by the group heads or their representatives.

All Schools.

These problems involved in meeting the needs and respecting the interest of the different groups cannot be solved satisfactorily unless a reasonable amount of time is provided for giving definite instruction in the wealth of occupational information involved in each activity. Frequently the time allowed for the various individual interviews, group conferences, and vocational studies is entirely too small. However, it is agreed that constant counseling is needed to parallel the intermediate school, continuation school, high school, and specific vocational instruction, in order to provide all pupils with reliable information regarding important occupations which are open to them.

In connection with each pursuit considered, the school counselors cooperate with the different teachers in disseminating information relative to the nature of of the work, the advantages and disadvantages, the qualifications and training, the possibilities, and the remuneration and advancement through reliable reading matter, group discussions, student reports, talks by specialists, and planned excursions. This organized information supplements that presented through the regular school subjects by presenting such related facts as can help pupils to weigh values and choose their future courses and life work. Aside from the direct guidance values, these occupational studies often include brief interpretations of economic life, industrial ownership, labor problems, related organizations, scientific management, supply and demand, and the development of our present-day producing and service groups, in order to encourage a wholesome attitude toward work and workers in each occupation studied. Typical divisions of such important life callings as are found in mechanical trades, printing and publishing, mining, food manufacturing, textiles and clothing pursuits, professional and allied occupations, engineering professions, commercial occupations, and others are profitably studied from time to time. While these representative studies are not designed to force early decisions upon pupils, recent investigations make it evident that there is need in every school organization for studying intelligently the problems of a tentative choice, both as to self-expression and efficient service.

General Summary and Conclusion.

As already pointed out in some detail, in large school organizations it quite often seems advantageous to make qualified school representatives directly responsible for (1) providing initial interviews and conferences; (2) following up and helping to adjust pupils; (3) arranging group meetings to hear special talks; (4) assisting teachers of English, social science, physical science, health education, practical arts and vocational courses in imparting related information; (5) cooperating with heads of departments and teachers in keeping suitable records; (6) cooperating with attendance teachers and working permit officials; (7) cooperating with placement officers, coordinators, and other allied agencies. These liberal occupational studies are being offered by teachers and counselors through group meetings and interviews to help all pupils choose more wisely their courses in the intermediate or junior high school and those who continue in school to elect more highly specialized courses in the senior high school, as well as in higher education. They likewise assist those who find it necessary to leave school with a minimum amount of education to choose their respective procedure more thoughtfully.

The great need and opportunity for dealing wisely with the problem of an efficient choice, both as to self-expression and social service, suggests that each pupil's decision might well come as a result of careful reasoning. Therefore, this decision might well be based upon an understanding of the pupil's resources and limitations and also knowledge of the economic facts, personal relationships, and relative values involved in *selecting a suitable life occupation and preparing properly for it.* Wherever these studies have been based upon actual facts and have received proper attention, they have not only vitalized the respective courses but have contributed materially to an intelligent understanding of the different aspects of the world's work.

Nevertheless, employers are becoming vitally concerned with the perplexing problems which confront them in selecting, "breaking in," and upgrading their employees. On the other hand, there are many examples of the increased realization on the part of employers of the urgent need for cooperation in order to eliminate unnecessary waste in excessive turnover and in other undesirable methods which are inevitable results of this hit-and-miss system of "hiring and firing." In other words, more and more employers are coming to realize that their immediate problems are inherently tied up with the instructional and guidance provisions which are being developed in public school systems for the benefit of all concerned.

All of the pupils on each level of learning need to acquire occupational intelligence and insight—correct understanding and vision of relative opportunities and requirements—in preference to that blind desire to secure jobs at any cost to themselves and their employers. Any socalled guidance system which conceives the scope of its responsibility as practically limited to that of placement—finding jobs for juniors who desire to take out working papers and secure employment, with little emphasis upon the problem of equipping children to secure the kind of preparation and employment for which their natural interests and capacities best fit them is losing sight of the larger values in preventative instruction, guidance and counsel, as well as the best accepted objectives for public school education. In any case, the spirit of public school education suggests that *collecting, evaluating, and imparting information about occupations should not become incidental in emphasis but rather a definite and functioning part of the whole school program.*

Stenciled Designs Applied in the Shop

William B. Wright, Public Schools, Albany, N. Y.

I SHALL never forget a remark made to me by perhaps the greatest of art teachers connected with public school work, the late Arthur W. Dow. I had been telling him that I was much interested in trying to correlate art a little more closely with industrial shop work; that it was a pity there was such a wide gap between the purely esthetic and the intensely practical temperaments and their work; and that perhaps the connecting link would be found through the medium of applied design.

His first remark was "Before we apply any design we must have some design to apply." And then he added: " The trouble with a good many shopmen is that they seem to think all that is necessary when a piece of work is put together is to apply the design." He meant to point out that without an art training the shopman could be of no help in the matter.

Conversely, Mr. Wm. H. Varnum in his admirable book on "Industrial Arts Design," points out very clearly that, without a knowledge of the limitation of tools and materials and the ability to reduce designs to the concrete form of a working drawing or model, the art teacher can be of very little help in the matter.

There is no question but that industry and art should work together and Mr. Leon Loyal Winslow, one of our advanced thinkers along these lines, points the way in his brilliant article.[1]

It is my purpose to set forth the results of a number of methods which I have successfully used in my classes in the seventh and eighth grades during this school year, and also to outline some methods which I am working out for future use. I will begin with the application of stenciled designs to small wood and metal objects such as book ends, sconces and the like.

The stencil is a simple, practical and commercial method of decorating flat surfaces and is well adapted to seventh and eighth grade work. The project of the book end which I have chosen to illustrate this method is also adapted to seventh grade work, which is the logical starting point for the junior high school. Of course, before taking up any project the boy must be able to square up a piece of wood to given dimensions, and understand the use of the plane, the try-square, the gauge, the saw and the chisel.

We must bear in mind that each industrial art project is divided into two main steps, *thinking it out* and *working it out.*

These are subdivided again as follows:

Thinking It Out.

(1) The rough idea.

(2) Freehand sketch or examination of models, catalogs, etc., to satisfy the idea of utility or beauty.

(3) Reducing these ideas to the concrete form of a model or working drawing.

Working It Out.

(4) Getting out stock and making layout.

(5) Tools and processes of manufacture.

(6) Finishing.

First Subdivision: This includes the field of interest which may be discovered as follows:

Teacher—"Every boy has some books. It is much better to have them kept neatly between book ends than to have them scattered in a disorderly manner around a table or bureau. I want you to plan some simple book ends which you can use for this purpose."

Second Subdivision: Teacher—"I am going to limit you to the use of ½" wood for the upright piece and a piece of sheet metal bent at an angle like the sketch on the blackboard (Fig. 1). Here is a book end which has been finished with a stenciled design (showing model). Yours will be finished in a similar manner. You may make the upper corners of your wooden piece

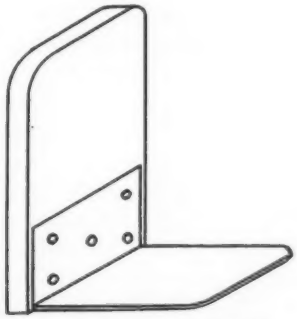


FIG. 1. SIMPLE BOOK END.

[1]Educational Review, Vol. 65, No. 5, May, 1923.

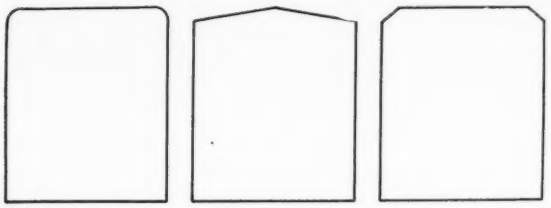


FIG. 1. FIG. 2. FIG. 3.

rounded (Fig.2), or tapered (Fig. 3), or cut at an angle of 45 degrees (Fig.4). Your problem of surface decoration will be limited by the shape you decide to make the book ends." (Selection.)

Third Subdivision: Teacher—"Make a working drawing of three views, top, front and right side (Fig. 5) and plan design as directed."

There are many short cuts known to the designer, of which I will give three instances.

(1) Trace front view in thin transparent paper and draw a margin line of 3/8" to 1/2". Lay this over squared underlay and work out straight line design (Fig. 6).

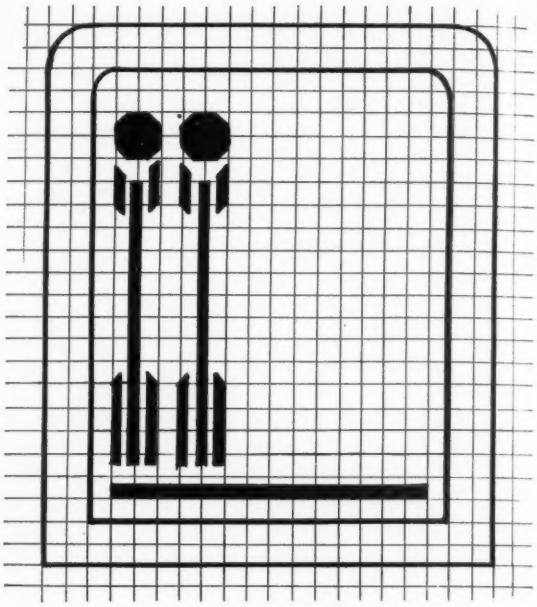


FIG. 6. LAYOUT FOR BOOK END DESIGN.

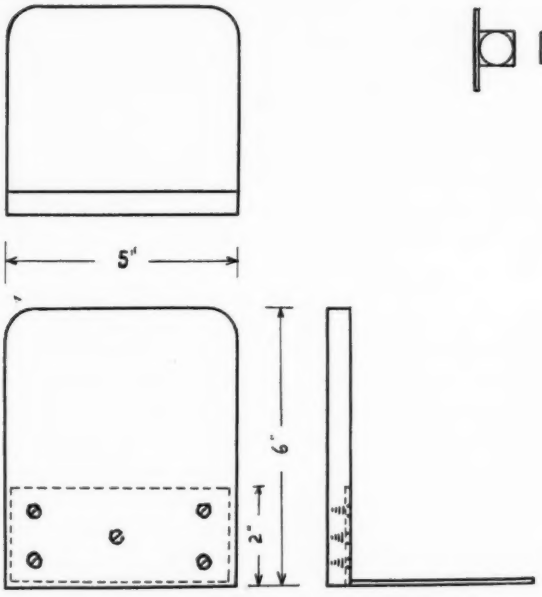


FIG. 5. WORKING DRAWING OF A BOOK END.

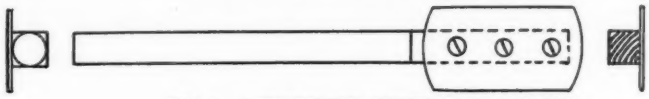


FIG. 7. A HOMEMADE CUTTER FOR STENCILS.

(2) Trace front view and fold vertically in center. Using margin line as before, draw freehand design within one-half and trace for symmetery.

(3) Use structural lines of the oblong (diameter, diagonal and perimeter) and develop design along these lines for orderly arrangement.

These designs may then be transferred on to mechanical drawing paper and the stencils cut with a sharp knife or safety razor blade which is excellent for this work. Fasten blade to stick of wood with two or three screws. (Fig. 7.) The stencils are now ready for use. Monochromatic, analogous and complimentary color harmonies should be discussed and good examples shown for suggestions in finishing.

Subdivisions four and five are covered by the following instruction sheet:

Instruction Sheet for Book Ends.

Materials:

1/2" white wood and some light sheet iron.

Steps:

(1) Select 1/2" white wood and rip off piece 5 1/4" by 13".

(2) Plane working edge and mark with pencil.

(3) Select best side and mark for working face.

(4) Gauge for width of 5" and plane to gauge line.

(5) Lay off with knife from one end the following dimensions: 1/4" for waste, then 6"; then 1/4" for waste, and again 6".

(6) With trysquare carry these dimensions all around piece.

(7) Place piece against bench hook or in miter saw with saw turned to zero and saw squarely across piece with the saw on waste side of each mark.

(8) Round the corners on one end of each 6" by 5" piece using radius of 1/2".

(9) Use sandpaper with small block of wood so as to preserve square edges.

(10) Cut 2 pieces of sheet iron 6" by 4 1/2" and round the corners on one end of each piece using the same radius.

(11) 2" from square end make a bend of 90 degrees by placing in vice and bending down against bench top.

(12) Hold the wooden piece on end on top of bench top with the round corners up and with the other hand place the 2" bent portion of the metal piece firmly against it and in the center and trace around it with knife.

(13) Set this in very slightly with chisel so that metal will be flush with surface of wood.

(14) Drill five holes for ⅜" screws and countersink for heads.

(15) Assemble by screwing metal pieces to wooden uprights.

Sixth Subdivision: Decide upon color harmony. Paint book ends some neutral color for background. Allow to dry and place stencil in position. Draw the brush across it using a brighter color to harmonize.

We found the following combinations pleasing:

Mahogany finish with a grey-yellow-green for stencil.

Flesh color enamel with grey blue for stencil.

Dark brown with two colors for stencil (black and orange).

This project can be successfully handled in two periods of two and one-half hours each, with perhaps a little extra time after drying for brushing on stencil.

EIGHTEENTH CENTURY PEWTER IN THE METROPOLITAN MUSEUM, NEW YORK.

Britannia Metal — III

Professor William H. Varnum, University of Wisconsin.

METHODS OF DESIGNING—A COMPARISON.

DESIGNS for Britannia, pewter, and silverware are so closey related that the principles are almost interchangeable. The old-time craftman designed, and afterwards executed his conception, thus giving full scope for individuality of expression. A comparison of design methods of the middle ages, with those of modern industry may develop many points of contrast.

The present silverware industry includes both sterling silver and plated ware; that is a soft or hard metal base (frequently Britannia) covered with an electrically deposited layer of silver. The shapes are classified as flat ware such as spoons, knives, forks and hollow ware; tea and coffee sets and similar table forms. Some firms extend this range and enter the field of decorative design producing pieces for church service, trophies, prize cups, candle sticks, mesh bags and vanity cases. There are many independent craftsmen who devote their energies to ecclesiastical design. As they not only make their designs but carry them out in metal, they resemble the craftsmen of the medieval guilds.

A silverware of Britannia design must have a feeling for good proportion, interesting contours, play of light and shade produced by contours and mouldings and by modeled designs. The designer sets about his task by selecting the largest piece of a popular set already manufactured, for example a tea or coffee pot. This may be representative of a certain historic period. From this he makes a rough pencil sketch identical in pattern. By changing this form, modifying it and adding new features, refining its proportions, adjusting appendages such as spouts, covers, handles to the body, a new design is evolved and rendered in water color to show textures, color and light and shade.

This design is submitted to the customer and if accepted, working drawings and blue prints are made and turned over to the factory foreman. If a modeled design is to be added, the designer makes a model of wax and casts it in final preliminary form in plaster, from which dies are made for stamping.

The silverware or Britannia metal designers art training includes freehand drawing from the object, from life and nature, light and shade, modeling, use of color for rendering forms, design, including proportion, contours and conventionalization, architectural styles, period furniture, historic ornament. He must possess a knowledge of methods of design in glass, metal, pottery, plus the necessary technical crafts factory knowledge. It is interesting to note that with all of this highly specialized art training, designers return again and again to the patterns and ideals of by-gone craftsmen, not only in metal but in many other crafts as well.

The Second Problem in Britannia.

In the preceding article, the processes of bending, seaming and soldering were described as applying to the construction of a cream pitcher. For class problems, a repetition of old laws coupled with new and interesting steps, is a well-tried principle of pedagogy. To adapt this to practice, I suggest the construction of a tea pot similar in design to the cream pitcher.

Plate 2 is explanatory to these steps. As the problem is of the elementary type, the design is simple and severe, in line with the interest and beauty concentrated in the contour curves and the texture and color of Britannia. The body and handle are constructed by repetitions of Steps 2, 4, 5, 6 and 7 of Plate 1.

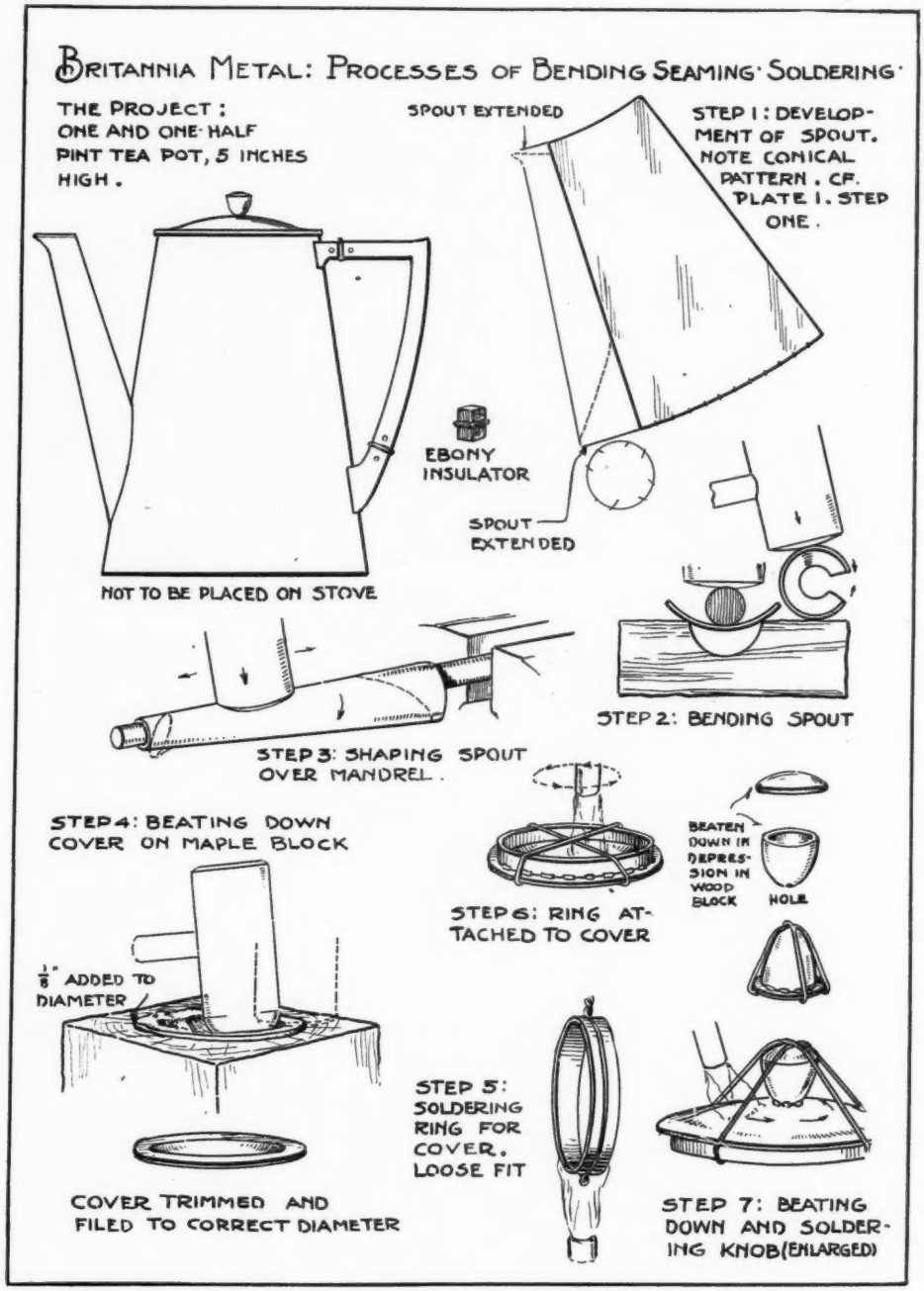

BRITANNIA METAL: PROCESSES OF BENDING SEAMING · SOLDERING ·
THE PROJECT: ONE AND ONE-HALF PINT TEA POT, 5 INCHES HIGH.
SPOUT EXTENDED
STEP 1: DEVELOPMENT OF SPOUT. NOTE CONICAL PATTERN. CF. PLATE 1. STEP ONE.
EBONY INSULATOR
SPOUT EXTENDED
NOT TO BE PLACED ON STOVE
STEP 2: BENDING SPOUT
STEP 3: SHAPING SPOUT OVER MANDREL.
STEP 4: BEATING DOWN COVER ON MAPLE BLOCK
BEATEN DOWN IN DEPRESSION IN WOOD BLOCK
HOLE
STEP 6: RING ATTACHED TO COVER
1/8" ADDED TO DIAMETER
STEP 5: SOLDERING RING FOR COVER. LOOSE FIT
COVER TRIMMED AND FILED TO CORRECT DIAMETER
STEP 7: BEATING DOWN AND SOLDERING KNOB (ENLARGED)

PLATE II. STEPS IN MAKING A TEA POT.

The only points wherein the steps differ is in size and insertion of a small ebony or ivory heat insulator. It is suggested that the handle be completed as a mass and afterwards severed with a hack or jeweler's saw,

at a point where it is desirable to insert the insulator.

The insulator may be chiseled or filed into shape, inserted and the ends firmly secured by drilling small holes in the handle and inserting a section of round silver wire in position, leaving enough protruding to cap over or rivet.

In designing the spout, it is well to remember that the height of the spout outlet controls the height of the liquid in the body of the pot. If the spout outlet is lower than the top of the tea pot, the liquid will run out before the container is fully filled. Structurally, the spout is conical in elevation and circular in cross section with its development for the metal pattern indicated in Step 1, Plate 2.

After the pattern is cut and filed to fit, the bending is accomplished by forcing it into a chiseled channel in a hard maple block by means of a round piece of brass or iron placed directly above the metal pattern and above the groove. By tapping the rod with a hammer the sides of the pattern are drawn into half a cylinder, when it is placed on top of the block and the sides brought together as illustrated in Step 2.

After the spout is soldered, taking care to place the solder on the inside while administering the heat from without, true into a perfect cone by the use of a round steel rod, ring mandrel or tinner's blowhorn stake, according to the size of the spout. In the truing process, the spout is turned clock-wise on the mandrel while the wooden mallet strokes describe a close spiral around the spout from end to end.

Emerging from this step fully trued, the tinner's or jeweler's curved snips will complete an approximate trimming of the ends and the half-round and flat files will bring the spout into complete contact with the body. This is a difficult piece of filing but has to be done with accuracy or the pot will leak.

Many craftsmen prefer to solder both spout and handle to the body before uniting the body to the bottom plate. If this is done, care should be taken to retain the perfect cone shape of the body throughout the respective solderings. The outward curve to the top of the spout is added by the alternate method of lipping in Plate 1, Step 5.

The cover offers the first true type of beating down or stretching of the metal into the shape desired. The easiest method of accomplishing this is to turn or chisel from the end of a hard maple block, a hollow of sufficient width and depth to fit the design. Then, cutting a circular blank one-eighth of an inch larger than the width of the design, proceed to manipulate the metal by strokes from the hemi-spherical end of the wooden mallet, (Step 4). Wrinkles in the flat margin caused by uneven stretching are eliminated by strokes from the flat end of the mallet. Trim to a true circle the portion of the cover completed and file smooth.

Step 5 shows the manner of soldering the cover ring which should be deep enough to keep the lid on the pot when pouring. Thorough fluxing should accompany all of these processes. In assembling the ring and cover in Step 6, the flame is moved in a circular direction *within* the ring, the idea being to heat the lid thoroughly and to lead the solder *through* the seam into the inner part of the ring.

PEWTER TEA URN OF THE NINTEENTH CENTURY, IN THE METROPOLITAN MUSEUM.

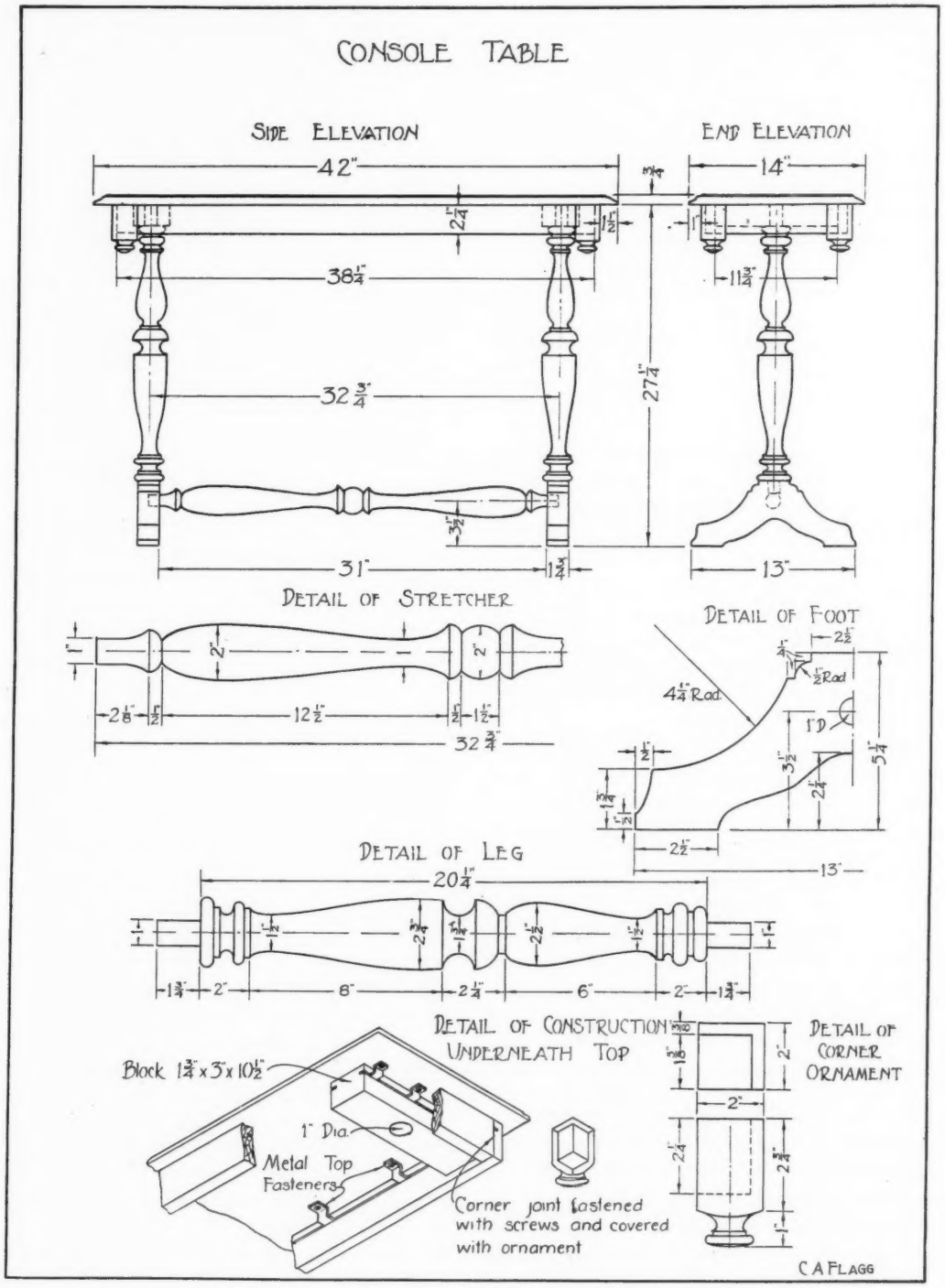
The knob is a two-piece problem. The top indicated in Step 7, Plate 2 may be shaped on the block of Step 4. A hole in the same block made with a large sized doming punch forms the mould for beating down the lower portion of the knob in which a small hole is drilled. This hole affords an outlet for steam from the flux when the two parts are soldered together.

With the surplus material removed and the knob slightly flattened at the point of contact, it is wired to the lid. Again must we direct the flame *around* the knob, thus heating the heavier mass, namely the lid, first; sufficient heat will radiate to warm the knob and flush the solder.

By filing or scraping away surplus solder, filing all surfaces true and softening sharp edges we polish the problem to harmonize with the cream pitcher by either of the two processes described in my last article. The only difficult area to polish is under the knob. Knot together a number of pieces of coarse string, fasten the knot in the vise and selecting the required number of strings apply tripoli and rub the intersection of the knob and lid back and forth. This will give a finished appearance to this part of the pot.

Hammered Surfaces.

Throughout the first problems, no steel hammers have been used. Old pewter was free from marks of the hammers and it is our object to work in that direction. When steel hammers and other tools are necessary to the achievement of the desired results, we are justified in the use of hammer marks where their glittering planes give a distinct attraction to the ware. An example of this is shown in the one-piece bowl with lid and knob on page 262 in the July issue of the Industrial Arts Magazine. The berry bowl on the same page is a built-up affair, quite similar to the problems with which we have been dealing. As no steel hammers or metal stakes were used, there is no reason or excuse for hammering or planing the surface.



Console Table

H. Willard, Virginia, Minn.

The console table in the accompanying drawing is the outcome of a close study of sound construction in light tables. It was built in the turning department. The only machines used were a 12"x24" lathe, a 14" bandsaw and a 6" jointer. These three machines were the only ones used in this department, as the tenon, mortise and any moulded work were out of the question. However, the table was constructed according to the drawing, and proved to be of very solid construction and yet simple enough for an eighth-grade student to work out satisfactorily. It can be made knock-down if all dowels are of a driving fit and the glue left out.

The stock for this table can be of poplar, mahogany or walnut. The top can be done in the new two-color or duotone finish. This is done by leaving the center of the top light, and putting a 2" or 2½" edge in a darker stain.

The legs can also be finished in the same way by leaving some of the prominent beads in the natural color.

The whole table can be finished in varnish rubbed dull, or given a wax finish.

Constructing Table.

The top should be glued up of a number of pieces so as to eliminate warping. The use of ⅜" dowels will strengthen the joints.

The legs are turned and the dowels on each end should be left 1/16" oversize until the final assembling. This is to take care of any shrinkage while the table is being made.

The feet are glued up of two pieces of stock. Cross the grain so as to give strength. The shape is laid out to suit, and the hole bored between centers before bandsawing. Draw center lines across, place chuck and drill in head-stock and place an absolute straight hole if the centers are in line. Bore stretcher hole by using tail pad in tail stock of lathe. A Forstner bit will give better service than a spur bit in a case of this kind as the opening can be struck with a divider and the bit placed in a more exact center. A sandpaper roll held between centers in the lathe and used for sanding the feet will eliminate a lot of handwork and produce a better surface.

The stretcher should be turned to exact length, as any irregularities in this will throw the entire table out of line.

The apron stock is grooved to receive the table top fasteners. A small 4" saw is mounted on an arbor held between the cup and spur centers. A rest is provided against which the stock moves. A small table with a simple lowering and raising device completes the "lathe saw table." The apron stock is nailed together. By placing glue blocks in the corners, it will help to strengthen it somewhat.

Apron corners are next squared up. These are turned and cut out to slip over the corners. The apron is next placed in position and tightened with metal table top fasteners.

The cross braces, or leg supports, can be made of any kind of stock on hand. The hole should be squares. These are grooved and fastened in place the same as the apron. All turned pieces can be stained, filled and given one coat of shellac in the lathe before assembling. This method saves considerable time.

The dowels can be turned to size and the table set together and finished.

RARE WOODS IMITATED.

According to the Canadian Woodworker, the Germans, during the world war, developed a number of synthetic products to replace much needed commodities of general utility. Synthetic food, synthetic clothing, synthetic medicine, and synthetic drink were the order of the day throughout the land. Everything from shoes to hair tonic was "ersatz"—imitation.

Many of the "ersatz" substitutions developed during the war by German ingenuity and industry proved almost as good and considerably cheaper than the genuine originals after which they were modeled. The "ersatz" commodity has therefore persisted as a factor in peace-time commerce and German manufacturers are continuing to devise new substitutes which, at lower cost, will satisfactorily replace the more expensive genuine products.

One of the "ersatz" industries is the production of cheap imitations of rare and expensive woods. The method employed involves the tinting of live trees to reproduce the exact shades of genuine mahogany, rosewood, teak and ebony, for the use of cabinetmakers. The roots of the trees selected for this purpose are perforated and rubber tubes inserted in the punctures. Especially prepared aniline dyes are then forced through the tubes and are sucked up through the roots, following the current of the flowing sap until the entire tree—trunk, branches, twigs, and even the leaves—is saturated with the coloring matter. A few days is sufficient to dye a tree three or four feet in diameter at the base and fifty feet high.

The dyeing process kills the tree, but that is of no consequence, since lumber and not landscape-gardening effects, is the object of the inoculation. When the tree is cut down and sawed up it furnishes a very passable and entirely permanent imitation of rare wood worth three or four times the cost of the reproduction.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN

Editors

EDITORIAL

CLOSING A DEAL.

Occasionally teachers may be observed engaging in other lines of business than their regular teaching tasks, especially during the summer vacations. This is all well and good, and many of them are great successes.

Sometimes, however, one is heard to remark after entering upon such business that "he does not propose to proceed upon the regular commercial basis; there are professional considerations to be observed." One man complained that he didn't take any stock in that "name on the dotted line stuff," although he had signed a contract that made the "name on the dotted line" the chief consideration. He simply had accepted a salesman's job and then discovered that of all things he was not a salesman. Instead of acknowledging the fact, such a person is disposed to talk and talk and raise "professional considerations."

How difficult it is to close a deal! What an art real salesmanship is! The proof of a sale and of salesmanship is the "name on the dotted line" or its equivalent. Multitudes of people attempt salesmanship and talk and talk and finally leave the transaction half finished and ready for closing up by the first real salesman competitor that comes along.

We wonder whether a good many teachers are real salesmen in the classrooms. Do they close their deals, or do they talk and talk and finally fail to gather up the whole matter and *really sell* the lesson or proposition or job to the purchaser—the student in the class?

Every recitation is a sale; every teacher is a salesman, good or bad. In every recitation there is a deal to close. The name must go on the dotted line, or there must be an equivalent acceptance. How many recitations we have seen and heard that got no where, that formulated no conclusions, that marked no definite progress toward a definite goal!

Education is on the way when choices are being made, when decisions are being formulated, and when thoughtful and intelligent work is in progress toward a specific end. The teachers who fail to bring things to a focus, who fail to get decisions made, who fail to "close the deal," also fail to teach.

LEARN TO DO BY DOING.

With the desire to give the most help to a class of twenty industrial art teachers in the short summer session the question was asked: "Which will be most helpful to you; practice in executing a series of problems or a discussion of methods and purpose?" Without exception the members of this class asked to be given a series of practical things to do and to make.

Of course the educational purpose and the school conditions come up for consideration with each project but this class was unanimous in the belief that what the teacher needs most is ability to illustrate and demonstrate.

Art teachers are appointed who are helpless in the practice of drawing and design. These teachers resort to a series of exercises that are copied from a prescribed course of study. If a reasonable copy is secured the purpose of the work is hardly questioned and the copy is considered and signed as original and thoughtful study.

It should be needless to assert that the teacher of art must be able to represent the simple forms of nature and art with assurance and to compose forms with unity, balance and harmony. A choice of things to use and live with may be cultivated by observing and discussing the properties of design but the skill and satisfaction of actual making is a most valuable educational process. How can a teacher of art carry on such work without the ability to execute?

The teacher who cannot draw and design is not effective in teaching the industrial arts.

THE MOST IMPORTANT SCHOOL PROBLEM.

The constitutional equality of birth right is under suspicion.

The careful estimate of each pupil in our schools by experts who may judge and advise the best amount and kind of school work to serve in each case is the most important school problem.

More important than any one or many kinds of study attempted in school; more important than physical equipment or increased financial support; more important than letter perfect standards, is the necessity of dealing with the individual as such and nurturing the natural talents.

The tendency to raise standards of scholarship, multiply kinds of study for all and put all pupils through a prescribed list of subjects has reached a point where the majority retain and make use of but a small part of the instruction given them.

There is reason to believe that if the schools continue to add kinds of study as they increase under social development they will weaken their instruction and go bankrupt in the attempt to satisfy enthusiasts. The alternative is for educators to discriminate between kinds of study and kinds of pupils.

We believe that the subject matter is of less importance than the method by which it is used as a means of development but no such complex variety of mind and interest as exists in the pupils of the least school community can be satisfied with a few academic subjects of accepted educational value. There must be subjects and methods employed that will appeal to each type of mind. There must be variety of method as well as of subject.

There must be expert teaching which will stimulate the weak as well as develop the strong. Each teacher of each school subject may well see in that subject all of the opportunities for a liberal as well as a special education, but no teacher can consistently say that a liberal education may be secured by every one who takes one or a few particular subjects. We believe in the industrial arts as a fundamental subject for education relating to art and industrial interests with which everyone is concerned. Just so the linguist; the mathematician; the scientist; the economist; the historian and the sociologist sees in each of these subjects the needs of a liberal education as well as special training for citizenship.

We do not believe that every child should be compelled to take a course in the industrial arts. We realize that some are not responsive to the incentives of industry or art. It is idle to insist that they should be. Some may get from other subjects equivalent incentive. They may miss some information which this subject gives but information is the least important advantage of any school subject. They may miss some dexterity that the subject gives but dexterity is not the greatest advantage of education. Both information and dexterity are useless unless made use of. Right conduct is the measure of a liberal and special education.

This selection of study that is adapted to each type of mind is most difficult, but we believe it is the important educational problem of the day. As industrial-arts teachers we must concern ourselves much more with the individual pupil and his or her right conduct than we do with a fixed number of exercises or the technical execution of them.

ARTISAN TEACHERS.

As a part of the general exhibit, the Eastern Arts Association has established a department known as "Members' Exhibit." In this department may be seen at every meeting of this organization some of the actual work of the teachers who belong to the Association. This exhibit includes painting, design, sculpture, jewelry, and other lines of work included in the general expression "Arts."

It has long been the opinion of the uninformed that teachers could not really do a creditable and workmanlike job of the art or craft or vocation which they professed to teach. The time was, we know very well, when the great artists were artisans and teachers as well as artists. It is most encouraging to find teachers actually offering the products of their own skill and genius for the inspection of their students, their fellow teachers, and the general public. It is the one sure way to people's confidence.

We do not know a more desirable thing than that every shop and studio shall have examples of teachers' work *in progress* so that there shall grow up a feeling among the students of confidence in the teachers' ability to produce in a masterly sort of way the actual work in which they undertake to give instruction.

BETTER UNDERSTANDING IN THE INDUSTRIAL WORLD.

There is still unrest in the world. Even now threatenings of strikes and industrial disturbances are to be heard.

When such things are possible something is wrong. That something is the lack of understanding or appreciation of one group of people for another group with whom there must be business dealings. The cure for such misunderstandings and difficulties is *understanding* and the spirit of fair play.

Wherever the owners, operators, or managers have gone directly into sane, unbiased conference with the men who do their work, progress has been made toward understanding and friendlier feelings have grown up toward the point of view of such workers. Also, when the men who do the industrial work come into sympathetic contact with those for whom they labor, they are usually struck by the simple and straight-forward method of their dealing and the apparent desire to do the proper thing.

One of the great difficulties in the way of harmonious relations between the so-called capital and labor groups is that they have emphasized and exaggerated their *differences* instead of their *common interests.*

There is no more fertile field for the teacher of manual, industrial, and vocational work than that of clearing up misunderstandings in the minds of the children of both groups, eradicating prejudices, and helping them to formulate consistent and just principles upon which both groups may unite for the common good.

This is a rather large assignment and requires a thorough-going knowledge of economic and sociological principles. No teacher is adequately prepared for work in this special field who has not made a considerable study of such principles. Teachers of industrial and vocational subjects have their great opportunity in helping the young boys and girls to get ready to bring the principles of economic justice and fair dealing into the industrial world.

EDUCATIONAL AND VOCATIONAL GUIDANCE.

All proper vocational guidance is a part of educational guidance and no education is complete today unless it provides the boy or girl the needed help in choosing some vocation wisely and preparing for it well.

There is no room in the world today for anybody who does not, in one sense or another, really earn a living and earning it means contributing to community welfare as well as self-support. The safest way to accomplish both these ends is, in general, to learn to do some one thing well—provided the foundations are laid in an adequate general education.

Educational guidance must prevent hasty, insecure, foundations and premature specializations. It is responsible for producing disciplined powers, broad outlook, and clear cooperative thinking, as well as for the more specific results sought through vocational guidance as such—*O. Latham Hatcher, Richmond, Va.*

Home Made Machinery—IV

Charles W. Frost, Central High School. St. Paul, Minn.

SANDING MACHINES.

THERE is no other class of work in the cabinet or manual training shop which seems so much like a waste of time to the teacher or foreman, as sandpapering by hand.

Any wide-awake boy who has had two or three years of woodwork in the grammar, or junior high school, knows as much about hand sanding as it is necessary for him to know. Such time as is devoted to it after he learns to do it satisfactorily is simply wasted, and taken from the hours which he should be using in learning more advanced processes. To the cabinet maker of limited means the time required for hand sanding represents a handicap not tolerated by his larger and better equipped rivals.

In common with many other manual training teachers the writer had long considered this particular waste of time a "necessary evil," because of the excessive cost of factory-made sanding machines of practical size. There the matter rested until a fellow instructor's success in building a circular saw inspired an attempt to construct other machines needed for the department, which the board could not purchase at that time.

A careful study of the various types of sanding machines on the market, together with considerable experimental work in adapting their principles to the limitations of the material to be used, evolved the machines presented.

The "combination disk and spindle sander" has already been described in this magazine; the other machines are shown in the order in which they were developed, without regard to their relative importance or usefulness. Two or more types could probably be combined in one machine, thereby effecting a considerable saving in floor space and expense. It is improbable that any one shop would require all of these varieties of sanders, but one or more could be used to advantage in almost any advanced manual training or cabinet shop.

The general details of construction are the same as in the other "home-made" machines described.

THE SLAT SANDER.

The slat sander was suggested by a sketch of a similar "home-made" machine which appeared several years ago in the Furniture Manufacturer and Artizan.

As shown in Figures I and II, the slat sander consists of a heavy horizontal wooden frame supporting a countershaft from which is driven a feed-bed (made from a heavy canvas-backed sand belt), running over a driving pulley at one end and an idler pulley at the other; with another idler pulley acting as a belt tightener, hanging between the two on one end of a weighted gate. The gate is hinged to one end of the horizontal frame. Above the feed belt, two carpet covered drums are supported in a frame, parallel to the main frame. These drums are covered with garnet paper of any desirable grade and belted to the countershaft. An idler roller on each side of the sand drums serves to steady the work as it passes below them. Below the feed belt is a carpet covered table which can be adjusted vertically to permit material of any thickness, from an eighth of an inch to an inch, to pass below the sand drums on the feed belt. The feed-bed is arranged to travel at one hundred feet per minute, and the sand drums at about three thousand feet.

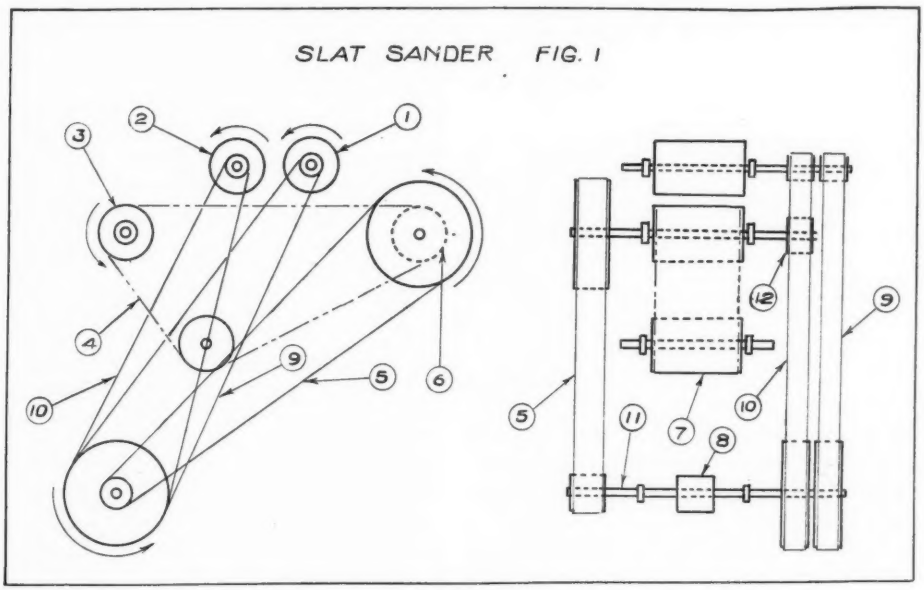
The slat sander can be converted into an excellent horizontal open belt, or platen sander, by simply disconnecting the driving belts to the sand drums and feed bed; unbolting and lifting off the frame carrying the sand drums (Number B, Figure II), and then connecting the small pulley on the right hand end of the feed-bed driving pulley shaft with the large pulley on the countershaft which usually drives the first sand drum (Number 10, Figure I).

When used as a platen sander, the sand belt travels at about 2,200 feet a minute.

THE PLATEN SANDER.

The machine shown in Figure 4 was built especially for smoothing up filing boxes, but can also be used for rapidly sanding any other small or irregular shaped work which can be held freehand against the open belt, especially shaped forms, or the flat platen.

The platen sander consists of a heavy wooden frame supporting a driving pulley at one end, an idler pulley near the other, and between the two, a second idler hung at one end of a weighted gate which is hinged to the back of the main frame near the top. This second idler acts as a tightener for the sand belt which runs over the three



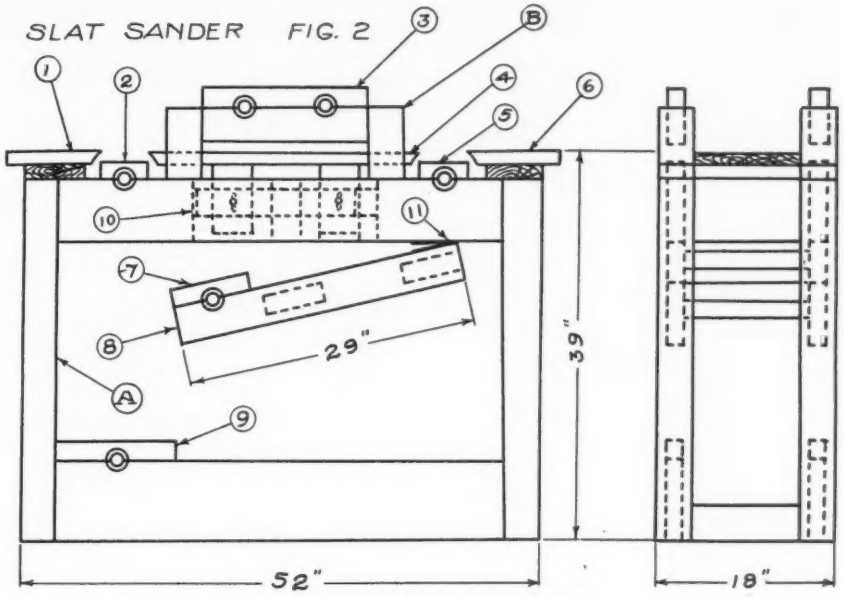


FIG. 2. DETAILS OF A SLAT SANDER.

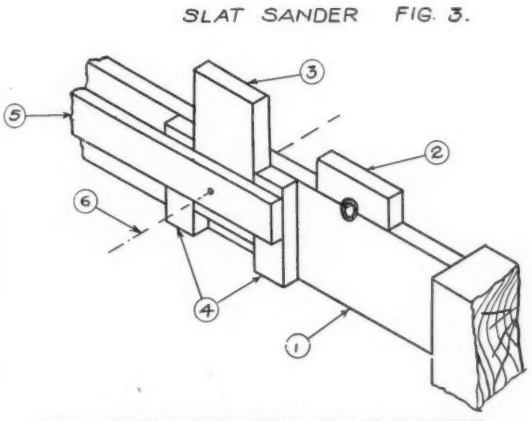


FIG. 3. CONSTRUCTION DETAIL OF A SLAT SANDER.

pulleys, keeping it tightly stretched at all times, yet giving sufficiently under pressure to permit sanding irregular shaped work of any kind. The "platen" is simply a heavy piece of wood covered with carpet and solidly bracketed to the front of the frame. Specially shaped forms of many kinds may be substituted for the platen.

The sand belt driving pulley must be covered with rubber to give a good driving surface, as a plain wooden surface does not furnish sufficient friction against the smooth paper back of the belt. An old inner tube, split lengthwise, makes a very satisfactory pulley facing for this purpose, but must be cemented in place over the entire surface of the pulley. If just tacked (as the writer tried at first), the space between the pulley and the rubber fills with air, forcing the rubber out in a bulge and tearing the belt.

The sand belt used on this and on the hand block sander is the plain paper belt for ordinary flat work, but for curved work (such as molding), the thin canvas belt is better as it will stand bending with less danger of tearing. Either style of belt may be purchased in rolls fifty yards long, from two to eighteen inches wide, and in any desirable grade of grit. Belts can be purchased made up to the required length. The canvas belt costs about three times as much as the paper. For general use a belt four to six inches wide has proven most satisfactory.

Special belt "lacing" dies may be purchased, but we have obtained very satisfactory results by dovetailing the ends together and backing the joint with strong muslin glued on. Such a joint should be made diagonally across the belt and should pass over the pulleys and under the work without a perceptible jolt.

The platen sander can be built as a horizontal machine, if preferred, but would occupy several times as much floor space as in the vertical form.

The work to be finished on this machine is simply rested on the table and firmly pressed against the rapidly moving sand belt. The pressure to produce the best results is easily learned by a little practice.

The table can be set to any angle below horizontal, and by means of the angle fence compound angles can be made in the same manner as with the disk sander.

The sand-belt driving shaft projects outside the frame to hold sanding spindles. When used as a spindle sander, the sand belt is thrown out of gear by hooking the tightener gate to the front of the main frame and out of contact with the sand belt.

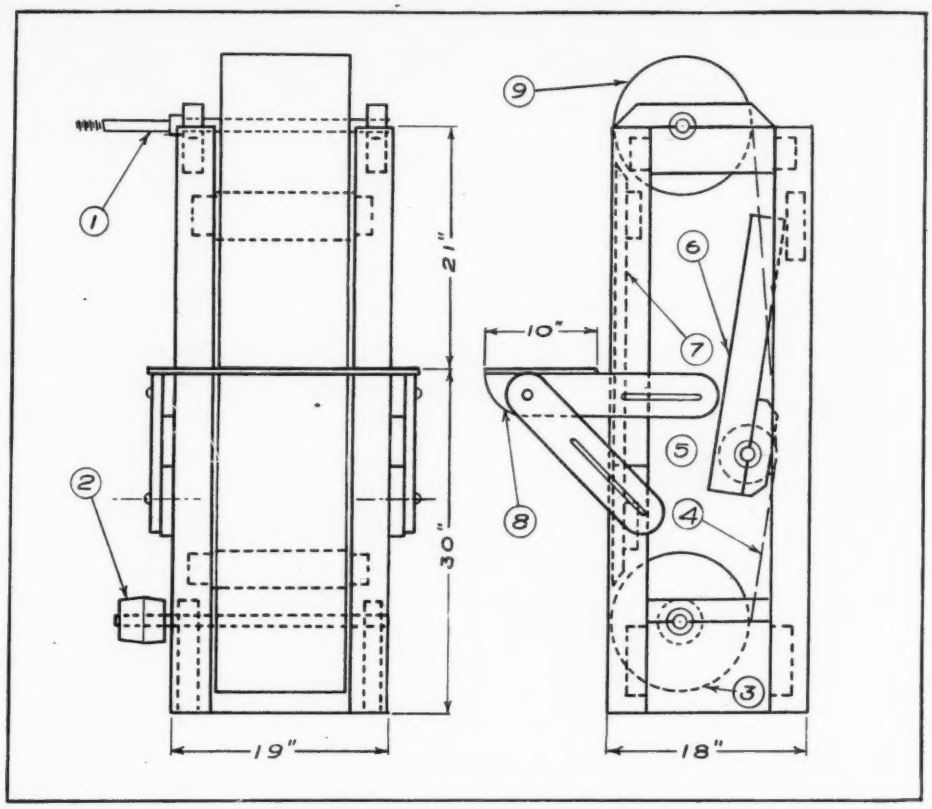
Names of Parts.

Slat Sander—Figure I. Arrangement of Belts and Pulleys.

1. Sand drum, coarse paper.
2. Sand drum, fine paper.
3. Feed Bed idler pulley.
4. Canvas feed bed.
5. Feed bed driving belt.
6. Feed bed driving pulley.
7. Feed bed tightener pulley.
8. Countershaft motor pulley.
9. Number one sand-drum driving belt.
10. Number two sand-drum driving belt.
11. Countershaft.
12. Feed bed driving pulley used only when machine is converted into a platen sander.

Slat Sander—Figure II. Details of the Frames.

A. Main frame.
B. Sand drum frame.
1. Front table.
2. Feed table idler shaft bearing cap.
3. Sand drum bearing cap.
4. Adjustable table.



DETAILS OF A PLATEN SANDER.

5. Feed bed driving shaft bearing cap.
6. Rear table.
7. Feed bed tightener shaft bearing cap.
8. Weighted hinged gate.
9. Countershaft bearing cap.
10. Table adjusting mechanism. (Details shown in III.)
11. Hinge.

Slat Sander—Figure III. Details table adjusting mechanism.

1. Side rail of table.
2. Feed bed bearing cap.
3. Adjustable table elevating bar.
4. Elevating bar guides.
5. Elevating bar clamp.
6. Clamp tightening bolt.

Platen Sander—Figure I.

1. Extension of shaft to hold sand spindles.
2. Motor driven pulley.
3. Sand belt driving pulley.
4. Sand belt.
5. Sand belt tightener pulley.
6. Weighted gate.
7. Platen.
8. Adjustable table.
9. Top idler pulley.

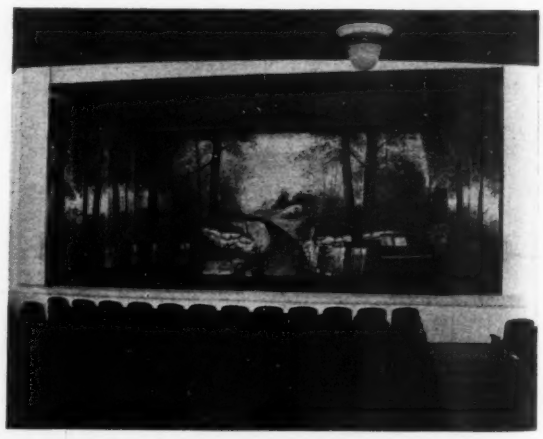
THE SCHOOL MAKES OWN STAGE AND SCENERY.

M. L. Brooks, Supervisor of Vocational Education, University Preparatory School, Tonkawa, Okla.

When Wilken Hall at the University Preparatory School, was designed the architects did not consider a well-equipped stage a necessary part of a school auditorium, so a small platform was installed. Teachers and students deplored the situation for a number of years, but nothing was done to help matters until the industrial department of the school became interested. The department decided it would be a good school job to make and equip a stage as a part of the regular classwork.

The dramatic club agreed to see that money was provided to purchase the material so the job was started the latter part of January, 1923. The drafting department prepared the plans for the job, then the carpentry class went to work. Every one in school was interested. The boys realized that they were doing real building and that it would stand as a sample of their workmanship.

The entire construction—woodwork, plastering, metal work, painting, and electric-wiring was done by the students and instructors. The girls in the domestic art class did the sewing for all the drop curtains. We have made six sets of scenery; one large interior which is used for regular assembly, one small interior which can be made into a business office, one outdoor woodland scene, one mountain scene, one store scene, and one combination



STAGE IN THE UNIVERSITY PREPARATORY SCHOOL, TONKAWA, OKLA.

exterior setting. The pulleys for the drops were made by the boys in the machine shops. The electric wiring is controlled by a special switchboard with a theostat so we can have the light effects we need. All this equipment has been made in our own shops.

The art department did the painting of the scenery. The different settings were painted in miniature so we would be sure as to the appearance of the job when finished. Fresco or scenic painting is very similar, in many respects, to water color work. We think anyone who can do water color work can paint scenery with some practice. They used regular Spanish white with distemper colors ground in water. The dry colors will work just as well but are not quite so handy to use. Good furniture glue should be added to the white as it is mixed, about one pint to the gallon.

In all this work the instructors have had a chance to make the boys and girls think about the work they were doing. The next day's work was discussed and each student asked to make up their mind how they would do the job. Sometimes we would have a job that might be done a number of ways. Each one was given a chance to decide which way he thought best and why. About one hundred people worked on this job as a part of the regular classwork.

The stage is 18 feet wide, 52 feet long, and 30 feet to the ceiling. The front opening is 16'x30'. All drops go up without rollers. The side wings are covered and painted on both sides. This makes for economy and also saves space.

The art department has painted two pictures in oil, 36x50, to be used in decorating the interior scenery. The shop boys have planned a large fireplace of sheet metal which will help to make things appear homelike.

We used five hundred yards of canvas for the scenery. The front is steel ceiling. The material for this job cost about $400. If the school had let the contract to outsiders it would have cost $2,500. We have a stage and equipment that any school might be proud to claim as the product of their own labor and skill.

Home-Making Lesson on Rugs

Margaret C. Ells, Head of Girl's Division—Continuation School, Springfield, Massachusetts.

A Study of the Selection, Texture and Cost of Rugs.

In beginning the lesson on rugs, the class studied the aim of the work which was as follows:

1. To teach these girls about the domestic rugs, within the reach of their pocketbooks when they furnish their own homes.

2. To get for a medium price a rug harmonizing in color and design with the furniture, wall paper, etc., of the room where it is used, and to obtain the best value possible for the money.

Samples of domestic rugs were obtained from manufacturers, and the girls tested these for quality, weave, color, design, etc. They saw why a closely woven rug is solid and will wear longer and look better than a flimsy, loosely woven one. Many points were brought out as the girls handled the samples, as to which rug would be easiest to sweep and keep clean, and therefore a help to the homemaker. How to clean a rug with a broom, carpet sweeper, or a vacuum cleaner was also taken up.

Real rugs were borrowed from stores (rugs suitable for every room from living room to bath room), and here again the girls had a chance to touch and to decide between a cheap rug and the best domestic rugs. Color and design were taken into consideration constantly in making selections. Colored plates of rugs with very vivid colors were contrasted with the soft pleasing colors, used in the better grades of domestic as well as Oriental rugs. They saw for themselves that one would soon tire of inharmonious colors and designs, and were charmed by the pleasing effects of proper color harmonies.

Related English.

A. Oral—The following questions were discussed for classwork.

1. Give the names of two styles of rugs, and tell briefly how you can distinguish them.

2. Why buy such rugs as you have mentioned? Can you not get cheaper ones? Why not buy them?

3. When buying a rug for a room, what must you take into consideration?

4. Would you put a dark or light-tone rug in a room with only one window? Why? What kind of a rug would you buy for a room having two or three windows, and much sunlight?

5. What colors are warm and cheerful? What colors are cold and make a dark room feel gloomy?

6. What other points should be considered in buying rugs, besides quality and color?

7. Mention some of the designs used in rugs about 25 years ago. Do you like or dislike them? State your reasons.

8. When you and I buy rugs for our homes are we going to imitate the old-time designs? Why? Why is it necessary for you to think of wall paper when buying a rug?

9. Summarize the main points we must take into consideration when buying our rugs.

10. What kind of a rug would you buy for your living room? For your halls? For your bedroom? For your bathroom? For your dining-room.

11. From the samples and rugs around you make a selection if possible for each room. State your reason for your selection in each case.

12. Which room will have the most expensive rugs? The most inexpensive? Why? Where will you put your washable rugs? Why?

B. Written—A selected number of the preceding questions were written for an English exercise.

C. Spelling—The following words grew out of our lesson on rugs, and were taken up as difficulties were encountered in spelling them.

1. Domestic
2. Weave
3. Design
4. Harmony
5. Manufacturer
6. Merchant
7. Oriental
8. Wilton
9. Axminster
10. Expensive
11. Washable
12. Selection
13. Choice
14. Decrease
15. Increase
16. Cheerful
17. Gloomy
18. Colors
19. Imitate
20. Dining-room
21. Installment
22. Method
23. Advantage
24. Salary
25. Foreign
26. Customer
27. Woven
28. Loom
29. Inventor
30. Invention
31. Dye
32. Dyeing
33. Weavers
34. Bobbins
35. Shuttle
36. Quality
37. Appropriate
38. Durable
39. Fabric

Oral Reading:

Booklets furnished by manufacturers telling briefly the history of rugs to the present day.

Community Civics:

1. In what store windows in our city have you recently noticed displays of rugs?

2. Name the stores in our city that deal in rugs.

3. If you wanted to make out a list of rug dealers in our city, where would you get your information?

4. In what section of the city directory would you look?

5. In what order is your city directory arranged? In what order is your dictionary arranged?

6. What is an index? Find the table of contents in your directory. How is it arranged? (Drill on use of index and table of contents.)

7. On what page does the business section of your directory start? Turn to it.

8. In what order is it arranged?

9. What do you expect to find in the business section?

10. Will the list of rug dealers or manufacturers come before or after the list of automobile dealers? Why?

11. Turn to the list of rug manufacturers in the business section. Where is the Bozart Rug Co. located? Hodges Fibre Carpet Co.? What car will I take to get to either of these factories?

12. B. H. Markarian Co. deals in Oriental Rugs. I do not find him listed under rugs. Where will I find him in the business section?

13. What stores in our city carry Oriental Rugs?

14. Is there a telephone at the Bozart Rug Co.? How can you find out? How indicated in the directory?

15. I live at 32 Byers St. What is the nearest rug cleaner to my home that is listed in the directory?

Related Arithmetic:

1. A rug marked $19.50 is to be increased in price ten per cent. What will the customer have to pay for it?

2. A rug marked $9.75 is to be decreased in price twenty per cent. What will it sell for?

3. Are rugs selling at an increase or decrease in price today? Why?

4. Present tariff on wools explained, and its effect on all woolen materials. (A suit of clothes now costs from $2.50 to $8.00 more than before the tariff went into effect.)

5. What effect will this tariff have on the price of rugs? Why?

6. Rugs marked as follows have been increased under the new tariff. Find the amount of increase, and the selling price.

Marked Price	Percentage of Increase	Amount of Increase	Selling Price
$ 9.75	20 per cent		
10.50	25 per cent		
45.00	10 per cent		
8.50	20 per cent		
25.00	15 per cent		
16.50	25 per cent		
42.00	25 per cent		
9.60	10 per cent		
26.50	20 per cent		
7.50	30 per cent		
13.75	10 per cent		
14.00	20 per cent		

7. A merchant has a stock of rugs that is not selling very fast. He decides to put them on sale at a discount, as new stock is coming in. Find the discount, and selling price on the following:

Marked Price	Percentage of Decrease	Amount of Increase	Selling Price
$13.75	20 per cent		
16.25	10 per cent		
12.50	20 per cent		
26.50	25 per cent		
7.50	15 per cent		
47.50	20 per cent		
18.00	25 per cent		
14.00	20 per cent		
12.89	20 per cent		
65.00	30 per cent		

8. If a girl or a woman earns a salary of $25 per week, and she and her mother are to start housekeeping, state how you would advise her to buy rugs for a living room, dining room, bedroom, bathroom and hall. Make out a plan for paying for these rugs, and tell what you consider the best method.

9. Would you buy all the rugs at once? Why not? Could you pay for them at once?

10. What method is planned by stores and clothing houses to help out people and enable them to get their things at once? Why wait for our rugs, when it is apparently so easy to get them by this method?

11. Do you like this method? Does it help you? State your reasons.

12. State the advantages and disadvantages of this method of buying goods.

Note. Much oral drill on percentages of increase and decrease was found necessary and given to the various groups, before written or seat work was given to test the teaching.

Related Hygiene:

Aim—To make the girls realize that: Cleanliness is necessary not only for the life of a rug but for the health of a family.

1. Where will you put your washable rugs? Why?

2. You have two rugs to choose from for your dining room, a fiber and an Axminster. Which will you choose and why?

3. From a health standpoint, why is it better to use a vacuum cleaner for a Wilton rug than a broom?

4. If you do not have a vacuum cleaner, how can you sweep a heavy rug with a broom without getting much dust?

5. What is easier to keep clean, a carpet, a large rug, or small rugs?

Related Geography:

1. Name the carpet factories located in your community; in surrounding towns and cities.

2. Using a map of New England locate: Worcester, Hartford, Palmer, Thompsonville, and Ware.

3. Using a Connecticut Valley Guide or Springfield Blue Manual, tell what trolley cars will take you to Palmer, Hartford, Ware, Thompsonville, and Worcester.

4. State where to get the car, and at what time.

5. What do you mean by Oriental rugs? What countries are included in the Orient?

6. Using a map of the world locate: Persia, Turkey, Syria, Damascus, Angora, China, Japan, India, and the Holy Land.

7. Define domestic and foreign.

8. Name two styles of domestic rugs; tell where they are made, and locate those places on the map.

9. Name and locate the principal sheep raising states in our country.

10. Why do they raise more sheep in Washington than in Massachusetts?

11. Would it be possible to raise vast herds of sheep in Massachusetts? State reasons. What are the people engaged in in our own city?

12. From what country of the world does our best wool come? Locate it.

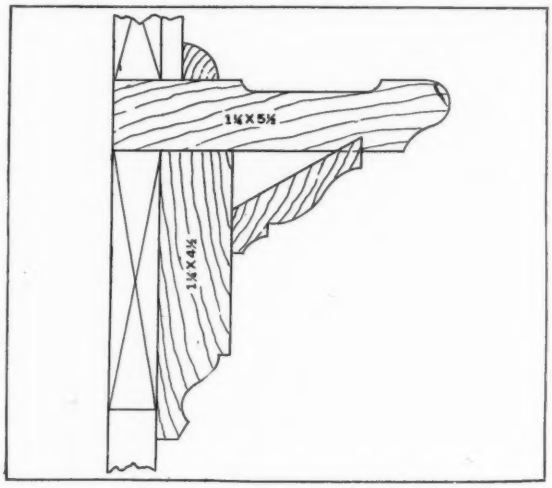
13. Locate the following sheep raising countries: Argentine, Peru, New Zealand, Australia, China, India, France, Scotland.

Note. The class debated on the advantages and disadvantages of the installment plan. Girls cited cases in their own homes, and brought out the point that much more was paid for an article bought on the installment plan than for cash. Reasons why installment houses must do this.

WHAT IS WRONG HERE?

The accompanying illustration is a horrible example of architectural detail submitted by an architect as a chalk rail for a school building. The editor of the INDUSTRIAL-ARTS MAGAZINE will send a check of $5 for the best letter criticising this detail from the standpoint of economic use of material, good construction and general utility.

Replies must be in hand not later than October 1st.



PECKHAM SCHOOL PUPILS REMODEL BUILDING FOR SCHOOL USE.

The boys of the woodworking classes of Peckham Vocational School, Buffalo, New York, under John F. Reid, their instructor, have remodeled the former residence of Dr. Leon S. Kurek for school purposes. The building, which was purchased by the city in October, 1922, is a three-story house opposite the Peckham Vocational School, and is to be used as its annex when the alterations are completed. It contains a principal's office, seven classrooms, a laboratory, a wash room, and a cafeteria in the basement.

As a residence it contained six rooms on the first floor, six on the second and three in the attic, as well as closets, cupboards, built-in bookcases, and the like. Winding open stairways led from the first to the second and from the second to the third floors. A full sized cellar, with concrete floors, and a boiler room of brick, is under the entire house.

It was unsuited for school purposes without remodeling as the rooms were not of proper size nor even of

STRAIGHTENING AND ENCLOSING A STAIRWAY.

desirable shape due to the number of partitions necessary for the many small rooms adjoining the larger ones. The open, winding stairways consumed too much space.

Under these conditions it was deemed best to completely rearrange the interior of the entire house to make it practical for school purposes. With this thought in mind, W. W. Miller, principal of Peckham Vocational School, and John F. Reid, the instructor in charge of the entire remodeling job, worked out a layout which would make more economical use of the floor space, and also meet with building conditions and laws.

The stairs were straightened, strengthened, widened, and inclosed. More windows were cut out and small windows made of standard size. New supports were necessary where partitions were removed and extra reinforcing was placed in the cellar to support the upper floors and to make the building safer. Entirely new rooms were necessary to secure the proper light and space.

Rough sketches of the proposed changes with the necessary instructions were given to the drafting class

MAKING AND PLACING 2" x 8" GIRDERS TO SUPPORT FLOORS.

under Ralph C. Smith. This class was given the task of solving the problems confronting the job and making the blue prints for all the remodeling work. It is a part of the architectural drafting course to make layouts, drawings and blue prints of buildings, hence this became a very practical problem for the boys in the drafting class.

The boys made the measurements for this work and drew the plans. Steel girders and steel columns were thought best from the cellar to the first floor. Mr. Reid pointed out the exact place where the columns and girders were needed, the drafting boys making the measurements. The supports were made from these blue prints and fitted perfectly.

Peckham is a vocational school of the Buffalo Board of Education. The purpose of vocational schools "is to furnish pre-employment industrial education to boys who plan to become eventually broadly trained, highly skilled journeyman mechanics." The aim of the various trade courses taught is: "To impart the technical knowledge and to develop the industrial intelligence and the manual and mechanical skills that are essential to the highest success and usefulness of the worker in a given trade and at the same time to prepare the worker to perform his functions properly as a member of society. The study of

REMOVING AND REPLACING PARTITIONS IN THE PECKHAM VOCATIONAL SCHOOL, BUFFALO.

the vocation for which the worker is preparing, in its relationship to the other vocations, and to society as a whole, is utilized to the fullest extent in the development of a proper conception of social responsibility."

The remodeling of this building was a purely educational project but it saved the city considerable money and gave the boys a splendid practical training. The boys of Mr. Reid's classes worked at it only as it fitted into their regular course. For example, every boy devoted one-half his time to book instruction in related English, mathematics, etc., the other half he devoted to actual shop instruction.

Thus any individual pupil "worked" one-half day on the building while the other half was given over to book instruction. Since these are all two-year courses, the first-year boys worked one-half day and the second-year boys worked the other half, thus keeping one set of boys at work all day on the building. The book instruction was closely correlated with all this remodeling work, keeping pace with the new problems as they arose from day to day.

All of the remodeling was done according to blue prints and specifications. Many partitions had to be removed. The boys took down these partitions and, after the first floor was reinforced through steel columns, and the floor supported by means of steel girders, new partitions were made according to blue prints.

Concrete bases were necessary on which to place the steel columns. The boys learned in the related instruction the proportions of sand, gravel, cement, and water necessary for the right kind of concrete foundations. The boys made the forms, mixed the concrete, poured it into the forms, and finished it off, thus gaining excellent experience in concrete work.

The supports for the second and third floors were made from 2x8 inch planks bolted together. These were made and dressed down by hand right on the job. This was done to give the pupils practical experience in reinforcing a building by means of wooden supports. In actual practice such work is done right on the job, as generally the pieces are too long to be transported from the mill to the job.

The boys did all the lathing after the uprights were in place. They put on the grounds (guide strips for the plasterer and carpenter to work to), just as is done in actual work. Each step of the construction work was explained by Mr. Reid so the boys learned not only the practical experience but also the underlying principles.

The doors, trim, finish, and the interior decorating was done by the pupils of the school. The interior decorating was done under Louis Kietit's instruction.

In all the remodeling some mill work was involved. This was done by the pupils under the instruction of John Hislop. The wood working courses at Peckham include a certain amount of "mill work" which means that the boys learn, during their course, to operate the various kinds of wood working machinery such as they would naturally be required to operate when they work in any wood working line.

As already stated, a pupil devotes one-half his time to related book instruction. For example, on the remodeling job, the classes in English under Edward MacCullough, wrote imaginary letters to manufacturers for prices, for materials, made out bills and other business forms as naturally would come up from time to time.

In the mathematics classes, Richard A. Reagan worked out the pitch of stairs, the number of treads needed, the problems connected with windows, doors, and figured board measure. This was then applied to actual conditions by Mr. Reid as the work was being done. Frequently Mr. Reid stopped some job, and taking the particular group, worked out problems, using the old walls as a blackboard.

The class in carpentry under Frank S. Mazurowski built a new school building to be used by other classes of the school.

COLORED CHALK AS FIRST AID IN TEACHING ELEMENTARY DRAFTING.

Edmund C. Hanley, Muskegon, Mich.

PERHAPS nothing is more discouraging to a mechanical drawing instructor than the first set of working drawings inked in by his group of students. We might offer consolation to the instructor who is out for his first experience, telling him we are not surprised to learn that the drawings accumulated during his first semester are more or less a collection of poorly inked lines and erasures and that he is trusting to luck he will not be asked to present them for inspection. He has probably felt by this time that he has missed his vocation and vows he will never return to teach school another year. On the other hand, he has probably proven an excellent instructor and has handled the instruction in a most efficient manner. The beginning results are naturally slow and it is a matter of time before the average student masters the tools and principles of mechanical drawing.

The instructor, who is relying on his own resources, depends to a large degree upon the blackboard as the background for his instruction. Eventually a problem is given on the board to be copied either directly or indirectly by the student. The instructor has demonstrated that the drawing is composed of various kinds of lines, each having its significant name and purpose; that a working drawing is composed generally of two or more related views. Further, that the drawing to be considered worth while, must include excellent lettering, show neatness, and above all, have the various groups of lines properly executed and of the correct tone or strength. All of these notations are imperative if the drawing is to fairly talk when completed.

The setting of the pen is demonstrated and the student is taught what lines to make heavy, medium and light. The student is given paper and tools to make his first inked drawing. He commences, he hesitates, commences again and then erases, hesitates again and then gazes at the board and the collection of various lines. Which did he say, he thinks to himself, of those lines

THE NEW HOME OF THE McKINLEY VOCATIONAL SCHOOL, BUFFALO, N. Y.

Border line	(Brown)	To be the heaviest line on the sheet.
Visible outline	(White)	A heavy line but lighter than the border line.
Invisible outline	(Orange)	Construct a medium strength, make dashes about ¼" long.
Dimension line	(Blue)	A light line, take great care in making the arrows.
Extension line	(Red)	A light line, make dashes about ⅛" long.
Cutting line	(Purple)	Construct this line of medium strength.
Center line	(Green)	A light line; avoid a lot of space between dashes and the dots.

ALPHABET OF LINES AND COLORS.

should I construct lightly, which should be heavy, etc.? He pauses and possibly seeks advice from his instructor. He happens to be busy and he returns to his desk and commences again as he is anxious to complete his first sheet, and he does, but as I have hinted before, it has turned out to be a sorrowful mess. And so it goes on, each sheet better than the one before, but he has paid the price through his mistakes.

I believe, in fact I have proven to myself for several years, that this trouble may be greatly eliminated and the percentage of first-class work increased from the beginning by presenting these elementary problems in drafting on the blackboard with the aid of colored chalk. If the method is to be used, the instructor will first have to establish a code of lines and related colors and when fully decided on the chart should be constructed upon the blackboard and so located as to be easily seen by all, and at all times. As a suggestion for such a chart the writer has prepared one, which is shown in the accompanying illustration. In addition to establishing these lines in color, a note should follow which should include the correct technical name, the desired tone in which the line is to be drawn, and such other notes as are deemed necessary. The mechanical part of working with the colors may gradually be done away with, and in a few weeks' time only a couple of colors used, one color doing for a group such as construction lines, and as the student becomes accustomed to the style of the work the scheme should be entirely done away with.

I might add that many notes, dimensions, etc., have to be given on the board that are not intended to be placed on the student's sheet, but we know from experience that no matter how much precaution we do take in such matters, these items do sooner or later appear on some of the drawings. I might suggest also that dimensions given and not to be copied, might be given with a circle around them, but this is not so practical or even possible in the notations.

A drafting room in which such drawings are neatly placed on the board in such a color scheme appears most attractive and inviting and all this helps to make the work of drafting a stimulant for the interest of the boy.

CHINESE ADDING MACHINE.

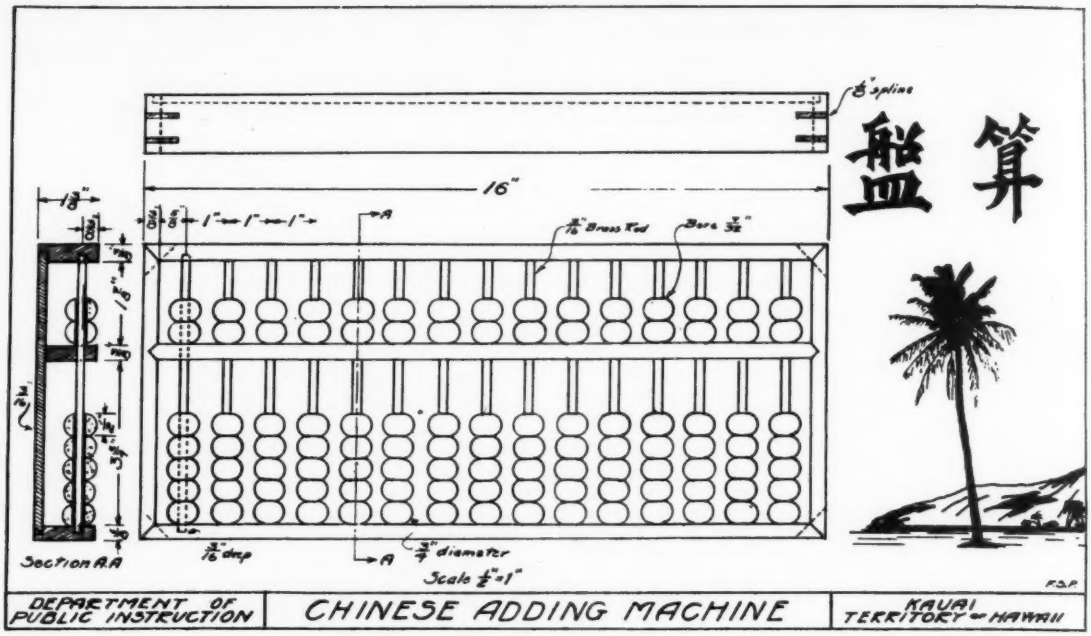
Frank S. Pugh, Eleele, Kauai, Territory of Hawaii.

Half the world's commerce is carried on with the aid of this little device which is as ubiquitous throughout Asia and the Orient as the Ford is throughout the United States. The Chinese merchant, who is to be found in every hole and corner between the Suez and San Francisco, uses this device exclusively in computing his accounts. It is simple to understand and operate and is very easy to make. Rightly it is a ninth grade problem, but the average eighth grade boy can easily make it, if he uses nuts or pieces sawed from a dowel rod or broom handle for the counting beads.

In China and the East in general, it is made of teak throughout, but any kiln-dried hardwood is suitable. The beads are laboriously turned out in a hand-power lathe. The working drawing shows the standard size used in Hawaii. There may be more numbers than the average high school student can use, but a little practice will show the value of the extra bead columns in keeping tab on a number of computations.

To make it, three pieces of mahogany ¾"x1⅜"x16" are squared up, clamped together in the vise, and the holes for the brass rod or reed laid off on them. The center one has the holes drilled all the way through, but the two outside ones are only drilled half way through. Brass rod is preferable because it does not rust or swell in humid climates, but ordinary basket reed can be used to advantage in the United States. Two end pieces ⅜"x1⅜"x6¾" are next prepared, the groove for the center strip cut and the ends of the frame mitered as shown in the sketch. Then cut the rebate on the frame pieces for

A PLEASED USER OF THE CHINESE ADDING MACHINE.



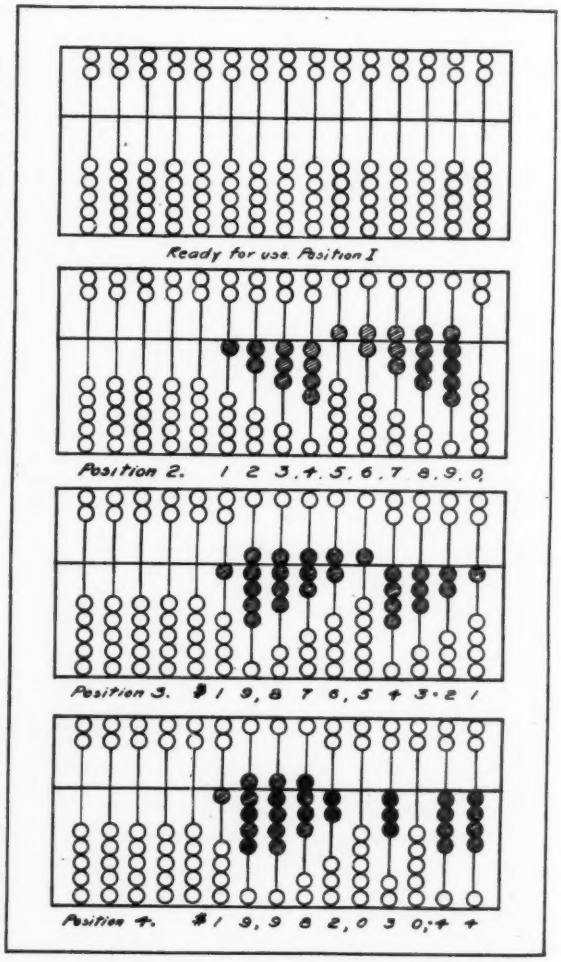
the reception of the backing which should be of three-ply hollywood or veneer.

The counting beads are now turned out in the lathe from mahogany. If it is a grade project, they may be sawed from a broom handle or dowel rod, and the corners beveled with the chisel or cabinet file while it is held in the vise. This latter method is more laborious but the result is just as practical as that turned out by a costly lathe. The counting beads are then bored slightly larger than the rod if it is of brass, but if reed is used, the holes should be of ample size to allow for the expansion of the reed in damp weather. The beads should be oiled, or waxed, to lessen the danger of splitting.

Now insert the reed or brass rods through the middle piece, allowing one end to project 2 1/16" and thread two beads on these ends on each rod. Then thread five more beads on each rod at the other end, fit the top and bottom parts of the frame on to the ends of the rods, tack on the two side pieces and glue up the frame. While this is drying, the back can be fitted into place, and also glued and nailed. It might be well to add right here that the inside of the back and frame must be polished or waxed before fitting them together, as this cannot be done after the adder is finished. When the glue has set, the splines should be fitted on the corners to strengthen them.

To use the adding machine it should be laid flat on the table or counter, and the upper counting beads moved up to the top of the device, as shown in position one in the drawing. The numerals can be started at any part. Position two shows the device set to the numbers one to zero. One is simply one bead of the lower group moved up to the center strip. Two, three and four are simply these numbers moved up also from the lower group, but instead of moving up five of them for the numeral five, we pull down one from the group above. Six is one from above and one from below or simply five and one. Seven, eight and nine are easily understood if the foregoing is clearly understood. It is shown in the sketch as shaded circles in position two.

Position three indicates an arbitrary sum of money as an example. To this sum we shall add the sum of $105,487.23, as an example. Beginning on the right side as in arithmetic, we simply add three beads to the first column and two beads to the second one. In the third column we find that seven and three make ten, therefore



METHOD OF USING THE CHINESE ADDING MACHINE.

this column will read zero representing nought, and we carry the one on to the next column. We add the one to the eight plus the four and again carrying the one to the next column we record the three of the thirteen by moving down one bead and leaving three. The next column being ten is again shown as zero by moving the top bead back to its place at the top. The rest of the computation will now be clear and a little practice will enable the user to operate the device almost as fast as the ordinary stenographer uses her typewriter.

A DRAFTING COURSE FOR A STEEL TOWN.

H. L. Tomkins, Phoenixville, Pa.

THE schoolmen of Phoenixville, in consultation with officials of local drafting rooms, have worked out a course that seems to more nearly fit the needs of a steel town than would a course in formal mechanical drawing.

The work makes it necessary for the student to carry mathematics through trigonometry, as a parallel course.

Two forty-minute periods each day, for three years, are spent in the school drafting room.

The chief draftsman of one firm tabulates the requirements for a good tradesman as follows:

Ability with instruments	15 per cent
Knowledge of plant drafting room	35 per cent
Knowledge of product	50 per cent
Total	100 per cent

Every machinist can tell stories of the young draftsman, who was unable to identify the completed machine part he detailed in the office. Consequently the first year in mechanical drawing is intended to develop ability to use instruments, while the following two years give the student some knowledge of products of the local industries.

In pursuing this plan the subject-matter is grouped under the following heads:

Product and shop.
Reading drawings.
Recognition of parts.
Where the draftsman commences.
How he does the work.

Some drawings are required of all students, some are supplementary, some are read entirely, while only a few desired details are selected from others. Parts are in some cases re-designed and re-detailed, the student making the necessary calculations. In others dimensions are blotted out and the student is expected to complete them; in still others, drawings are corrected to conform to standard practice.

The entire detailed course is too cumbersome to be printed here, but the following synopsis is suggestive:

PHOENIXVILLE HIGH SCHOOL MANUAL TRAINING DEPARTMENT.

Mechanical Drawing Course.

Attaching Paper.
Pencil—Ruling Lines.
Triangles—Parallel Lines—Perpendicular Lines—Arcs—Bow Pencil—Compass, Curve—Measuring—Scaling and Scales—Lettering—Dividers — Quadrants—Views—Position—Relation, Sections—Auxiliary Views—Layouts.
Conventional Lines—Arrows.
Dimensions and Rules—Notes.
Order of Penciling and Inking Titles—Bills—Threads—Helix—Bolts and Fastenings—Symbols—Blueprinting—Working Drawings—Detail Drawing—Assembly Drawing—Alterations—Gears—Cams—Machine Sketching—Geometrical Drawing—Angles—Lines—Triangles—Polygons—Developments and Intersections.

Course in Structural Drafting.

Footings,
Anchor Bolts,
Windows and Doors,
Sheds,
Monitors,
Expansion, Provision for,
Upsets,
Turnbuckles,
Crane Clearance.

Templets.
What the templet maker needs,
Lattice Columns,
Lattice Railings,
Floors,
Partitions, Walls,
Wall Connections,
Stairways,
Inclines.

Rivets.
Conventions,
Tables,
Holes,
Driving,
Sizes,
Spacing.

Riveted Connections.
Net Sections,
Kinds of Joints,
Center of Gravity,
Eccentric Stresses,
How Drawn or Shown.

Shop.
Operations,
Drafting Department,
Equipment,
Ordering Material,
Drawings,
Bills, Shipping,
Inspection,
Erection.

Simple Empirical Formulae.
Use of a Couple of Simple Formulae (Beam) and location of the rest.
One Column Formula,
Tables for Checking These,
Some Shear and Moment,
Diagram Work.

Plate Girder.
Bridges (Blue-Print Reading),
Through Plate Girder Type,
Deck, Plate Girder Type,
Construction,
Uses,
Web,
Flanges,
Economic Depth,
Stiffeners,
Web Splice,
Flange Rivets,
Flange Splices,
Stringers,
Cover Plates.

Handbooks and Location of Data.
Smoley,
Ketchum,
Phoenix.

Buildings.
Roofs,
Trusses,
Types,
Construction,
Loads,
Stresses, Tables,
Roof Coverings,
Purlins and Connections,
Column Connections,
Detail Drawings,
Hips. One Building Only,
Bridges,
Types,
Tension and Compression Members,
Laterals,
Detailing Pin Connected Bridges,
Camber,
Pin Location,
Floor Beam Detail,
Columns.

Beam.
Beam and Channel,
Plate and Angle Columns.

Boilers.

Kinds and Description.
Furnaces, Grates, Stokers, Foundations, Baffles, Firebrick, Boiler Proper.
Drum, Header, Tubes, Circulation, Mud-drum, Blow-Off, Deflection Plate, Dry-pipe, Manholes, Handholes, Steam Outlets, Other Outlets, Seams, Stays, Standards, Covering.

Methods of Support.
Front Beams and Columns, Rear Under-Leg Supports, Lugs, Saddle.

General.
Tests, Insurance, Erection Equipment, Ordering, Contracts, Guarantees, Efficiencies.

Fuel.
Storage, Oil, Burners.
Ash—Removal.
Fronts—Material, Size of Doors, Outlets.
Rear Casings—Cornice, Sills, Pilaster, Doors.
Feed Water—Injector, Pump, Heater.
Accessories—Gages, Safety Valves, Water Columns, Fusible Plugs, Soot Blowers, Check Valves.
Stack—Connections, Kent's Table of Sizes.

Books and Material Used in Mechanical Drawing.

Outline, follows French and Svensen.
Projects, Mechanical Drawing for High Schools—Leads and Sketches for Mechanical Drawing by Anson Weston Smith.
Reading, Mechanical Drawing for High Schools—Atkinson Mentzer & Co.
Layouts, Service Sheets given by many companies.
Periodical, Machinery Magazine—Industrial Press.

Structural Drafting.

Text, Structural Drafting—Am. Technical Society.
Handbook, Phoenix Iron Co.
Data, Phoenix Iron Co.
Projects, Phoenix Iron Co.
Reference, Structural Engineer's Handbook—Ketchum.

Boilers.

Course, Specifications for Boilers—Sweet's Engineering Service.
Text, Helios—Heine Boiler Co.
Boiler Logic—Heine Boiler Co.
Marine Boiler Logic—Heine Boiler Co.
Steam—Babcock and Wilcox.
American Society Mechanical Engineer's Handbook.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

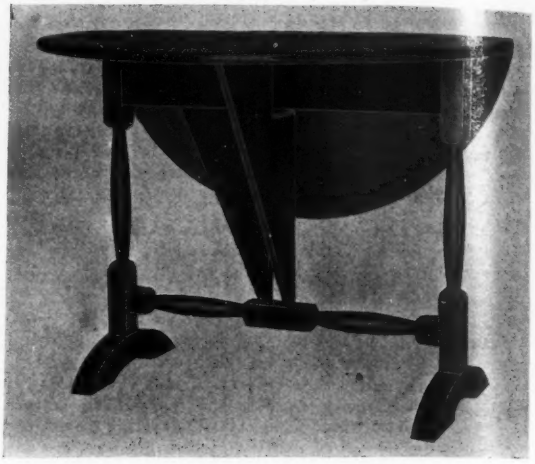
Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taboretes, towel holders, etc., which have been made from time immemorial, ad nauseum.

BUTTERFLY TABLE.

Lee M. Klinefelter, Maury High School, Norfolk, Va.

This little table is one of the simplest of the "butterfly" family, and at the same time has considerable to be said in its favor. The frame is reduced to its simplest form, the turning offers no difficulties, even for a beginner, and the wings fold close to the center, allowing a very narrow top when the leaves are down. A rule joint is shown in the top; if facilities are not at hand for cutting it, square edges may be used. However, the rule joint, if well done, is worth all the trouble it takes. It can be cut on the jointer, of course, but in most school shops will have to be done with a combination plane.

This style of table was made in America in the early part of the eighteenth century, before mahogany was used to any great extent, and when furniture was made of the native woods nearest at hand. Consequently, it can be made from almost any of the common varieties without violating its traditions.



BUTTERFLY TABLE MADE BY MAURY HIGH SCHOOL STUDENTS.

A BORING TOOL.

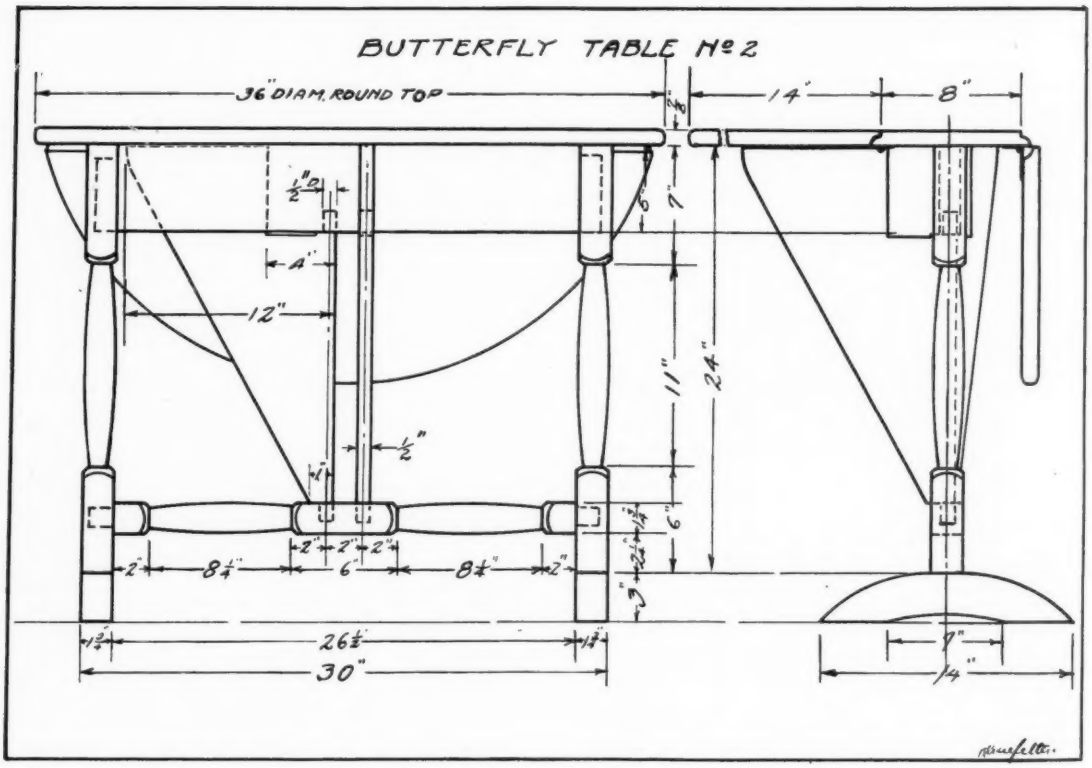
William Sambrook, New Haven, Conn.

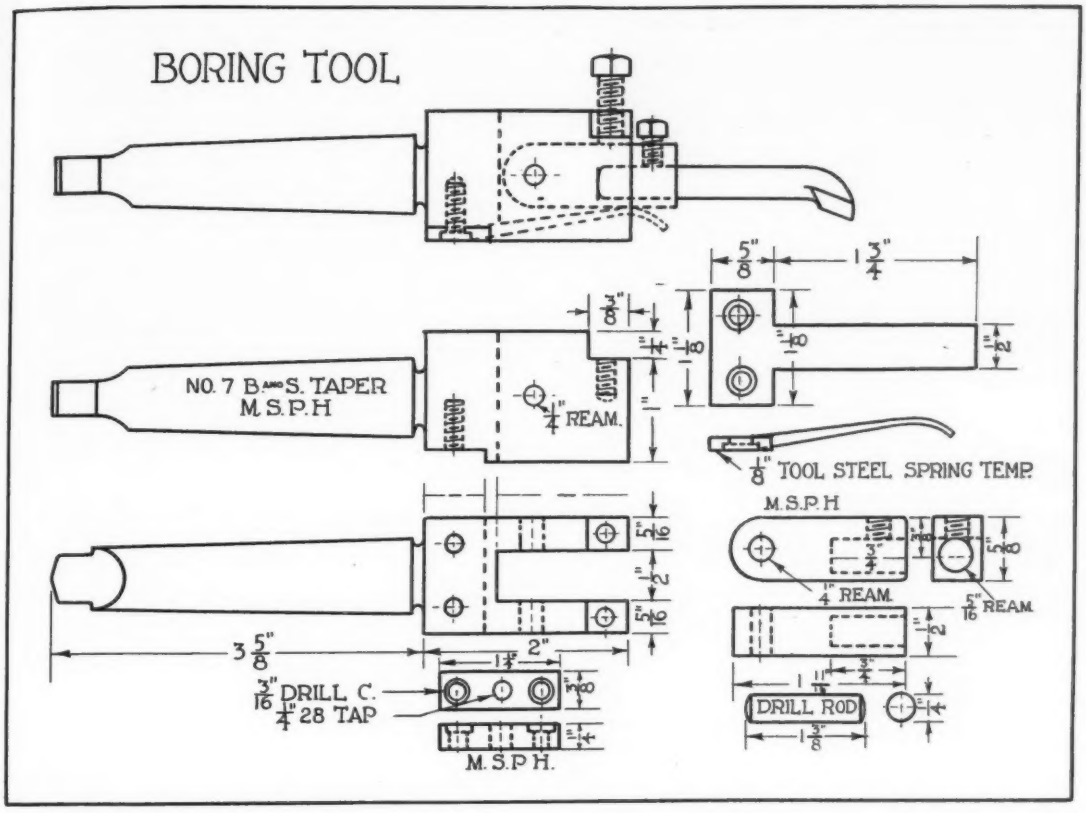
The boring tool, illustrated in the accompanying drawing is valuable for jig and fixture work and will bore holes from ½" to 3". For very small work, a smaller tool may be used. The shank and body of the device are made from one piece of machine steel.

The spring is made of tool steel, carefully spring-tempered. It is bent and drilled for filister head screws as shown.

The tool can be easily assembled by boys in the shop and will be found useful for general purposes. The operations may be performed as follows:

Shank and Body. 1. Plane stock to 1¼x1⅛ on the shaper. 2. Turn taper shank and square ends on the lathe. 3. Mill tang on shank. Mill slot in body for tool





holder, also mill for spring and adjusting screw plate, using the index head (milling machine). 4. Drill and tap for screws on the drill press.

Boring Tool Holder. 1. Plane to size on the shaper. 2. Drill for center pin, also for boring tool and tap for set screw on the drill press.

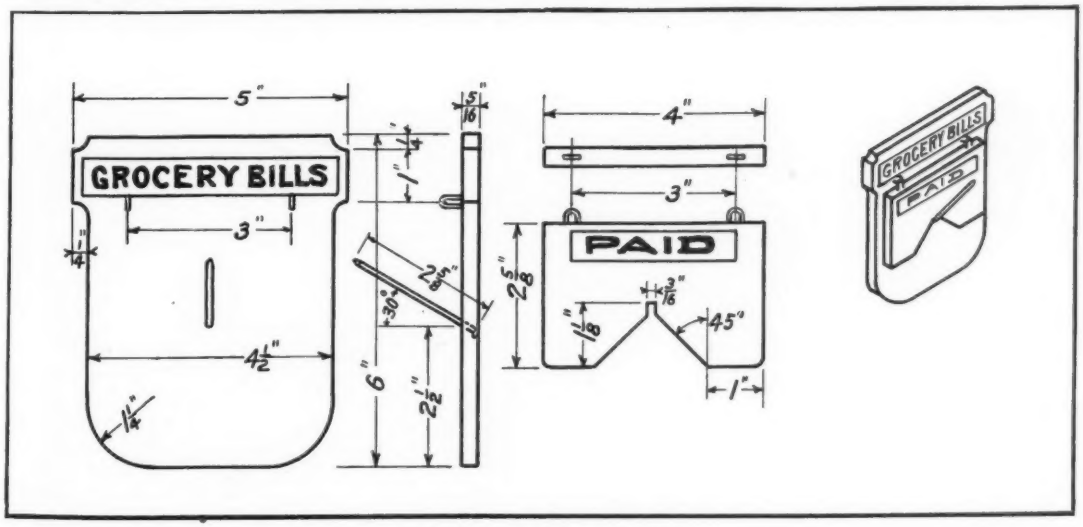
Adjusting Screw Plate. 1. Plane to size on the shaper. 2. Drill and countersink for filister head screws, and tap for set screw (drill press).

A WALL BILL FILE.
W. W. White, Waterloo, Iowa.

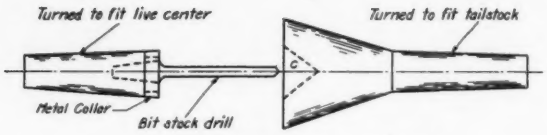
This problem has been found useful for beginners' wood working classes. It includes the design of the back which may be varied according to the boy's own desires and affords an opportunity to employ a considerable number of elementary working principles. In the Waterloo schools, the lettering is printed on suitable tinted stock in the school print shop and is attached with glue to the wood, before the whole is shellacked and varnished.

JIG FOR BORING TOOL HOLDER.
Stanley Mythaler, Valley City, N. D.

This jig was constructed because we had a number of tool handles to be fitted to files and chisels during each term. Both pieces were turned between centers from hardwood. A cone-shaped hole (c) was cut with the skew chisel, while the piece was in the live center. The hole



DETAILS OF A WALL BILL FILE.



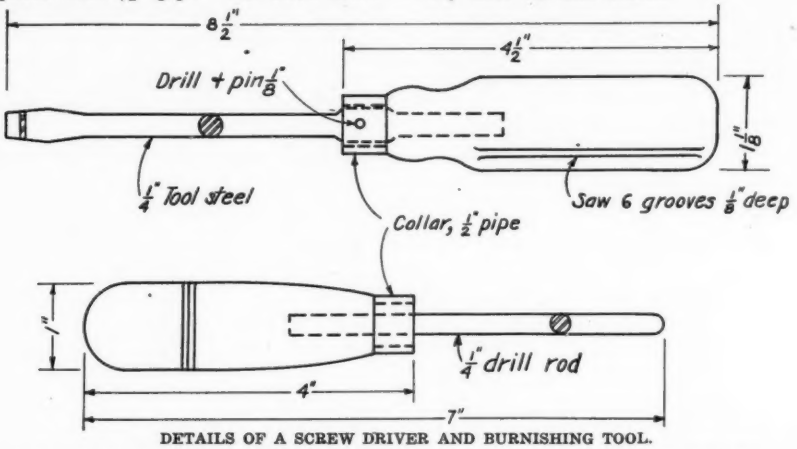
JIG FOR BORING TOOL HANDLES.

for the shank of the bit-stock drill was cut with a small skew and then filed square.

SCREW DRIVER AND BURNISHER.

Stanley Mythaler, Valley City, N. D.

The handles were turned on the lathe and collars were made by sawing pieces from ½" pipe. The screw driver blade was first forged and flatted slightly where it was to be drilled. Both tools were tempered and then assembled. Tool steel, or an old saw file, may be substituted for drill rod in making the burnisher.



DETAILS OF A SCREW DRIVER AND BURNISHING TOOL.

A JELLY-BAG FRAME.

John Capel, Owen Sound, Ontario, Canada.

The domestic science department found itself in need of a suitable frame from which jelly bags may be suspended while the jelly drips into pans below. The manual training department was asked to design and construct a frame to replace the crude "broom and chair" method.

In the making of the frame, the pupils kept in mind the requirements of the department and the abilities of the average eighth-grade student.

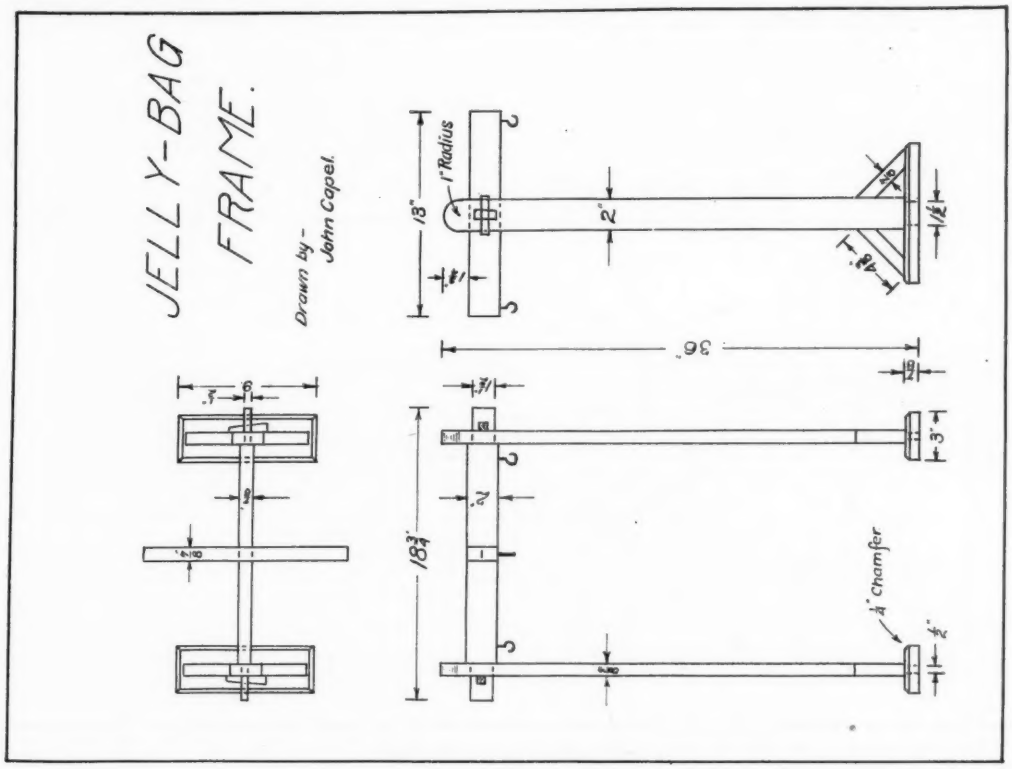
In the work, three distinct joints were utilized: cross-halving, mortise-and-tenon, mortise-and-tenon keyed. Besides these joints, a chamfer and a miter cut were used.

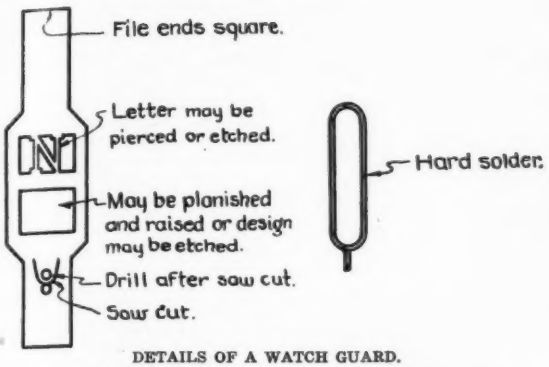
The frame is so constructed that it may be taken down in the fall after the jelly season is over, and stored away until the next season.

WATCH GUARD.

Arthur W. Neff, Eastwood, N. Y.

A novelty in the metalry art which is quite in vogue this season, and which involves many of the processes of




File ends square.
Letter may be pierced or etched.
May be planished and raised or design may be etched.
Drill after saw cut.
Saw cut.
Hard solder.

DETAILS OF A WATCH GUARD.

metalry, including filing, piercing, planishing, chasing, raising, forming and soldering, is the watch guard illustrated.

It is a problem embodying the esthetic details of the Greeks, and at the same time, maintaining the utilitarian principles of the ancient Romans. The material may be either 22-gauge sheet copper or silver, 5/8" wide by 2½" long.

The design illustrated is not empirical and may be modified or developed into numerous pleasing effects.

A PROBLEM IN MOULDINGS.

Edwin M. Love.

The library table in mahogany, illustrated herewith, was made by two night students of cabinet-making and wood-turning at the Alhambra, Calif., high school. Though the general design offered no great difficulties in construction, the carving of the mouldings furnished excellent training in the use of hand tools.

The top, exclusive of the edge mould, is 30" by 48", five-ply, ¾" thick. The 1½" mould is doweled to the edge, being mitered at the top so as to hide any end grain of the veneer. The rabbit plane and a ¼" round nose scraper readily shape up the small ogee and round. As

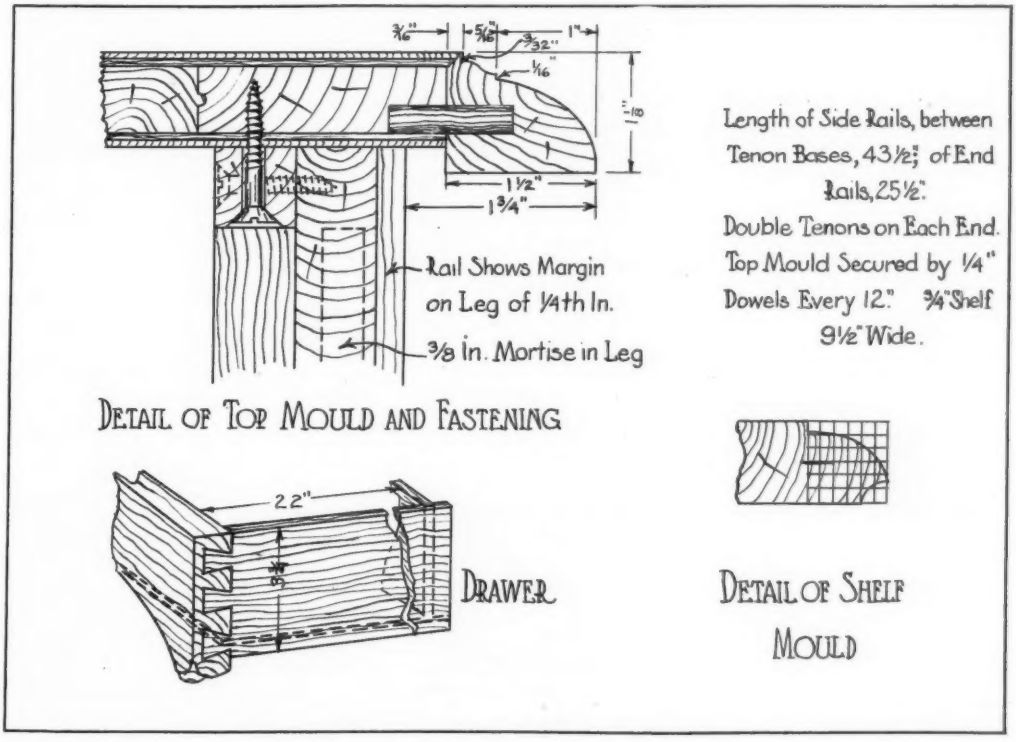
THE COMPLETED TABLE.

indicated by the details, most of the curves throughout the table are conic sections rather than arcs of circles, thus giving a rich play of light and shadow.

The rails, bandsawed to shape and with double tenons cut, are ornamented with a combination 3/32 rabbit and elliptical curve. The drawer rail is laid out ⅛" longer than its mate, so that when the drawer front is cut from it, as shown in the drawing, there is stock enough for fitting the drawer. The drawer guides and slides are cleats running full width of the table, and like the rails, have cleats glued and screwed on them, to which the top is screwed.

The drawer is dovetailed in front, using ½" red gum for the sides and back and ⅜", three ply Oregon pine panel veneer for the bottom.

The magazine shelf, 9½" wide, has both edges moulded as shown in the drawing, and is doweled to the straight edges of the brackets which, with the exception of the straight edge, have a double bead and cove mould worked on all edges. The ends of the brackets dowel into the square portions of the turned legs.



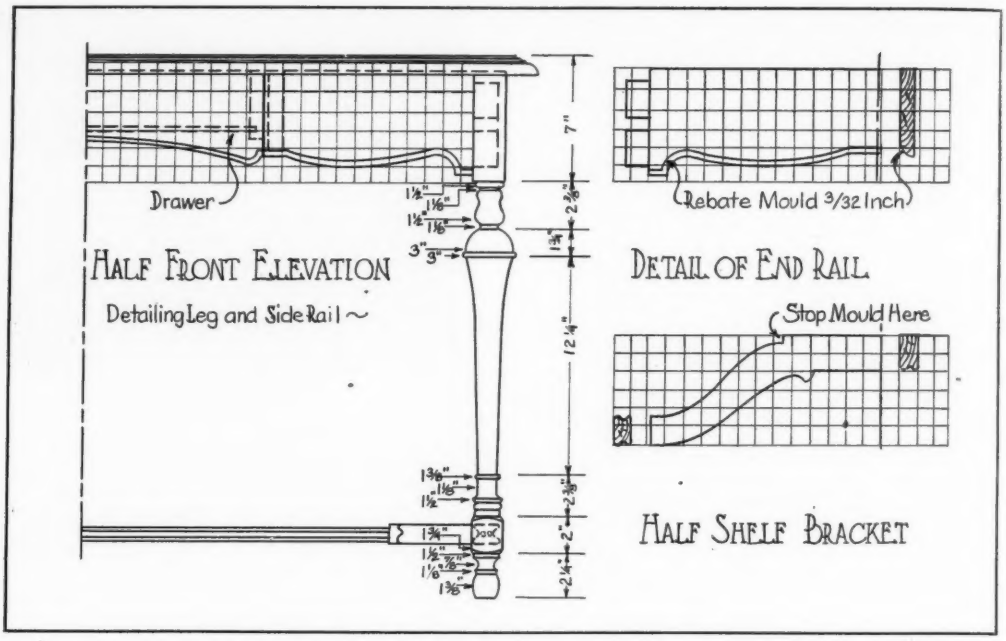
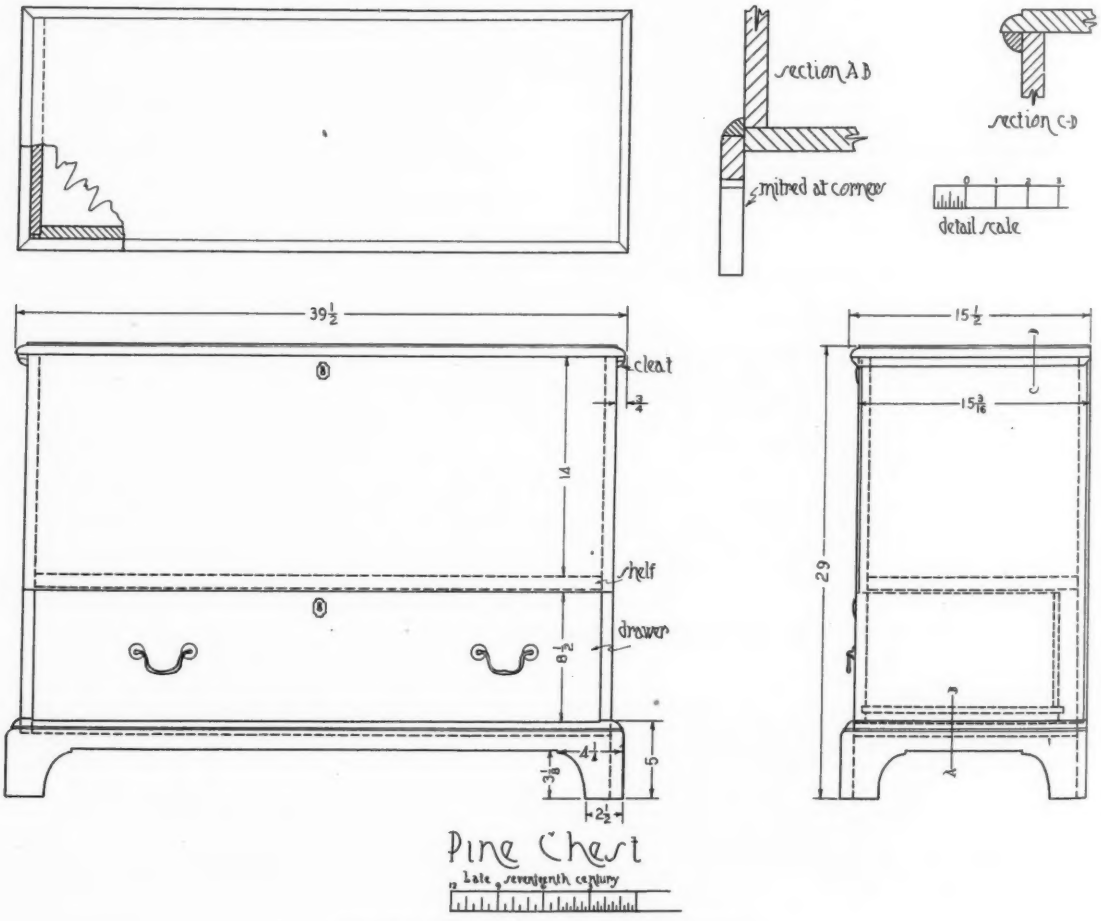


TABLE IN MODIFIED WILLIAM AND MARY STYLE. SEE PRECEDING PAGE.



DETAILS OF ANTIQUE COLONIAL PINE CHEST.

PINE CHEST.

B. N. Osburn, Ottumwa, Ia.

The chest was probably the first form of movable furniture made and its utility made it of importance to the early New Englanders. The pine chest shown here departs from the simple box form to the extent of including a deep drawer and being raised on feet. No ornamentation is attempted except for the slight chasing on the brass. The lid, with cleats at each end, swings on hinges at the back. Inside the top are short strips fastened across one end and along the front and back, on which a small box or till formerly rested.

THE PINE CHEST AS IT APPEARS AT PRESENT.

The ends are gained into the front and back as far down as the drawer top where, at the front, they protrude even with the face of the chest. The base is mitered at the corners and fits up around the chest at front and ends; the juncture is covered by a simple moulding. This is partly cut out in front to permit the drawer to slide in and out on the bottom piece of the chest.

Stock Bill.

Cutting sizes.

Name	number	T	W	L
Lid	1	⅞	16	40
Cleats	2	⅞	1	16
Front	1	⅞	16	38
Back	1	⅞	25	38
Ends	2	⅞	15	25
Shelf	1	⅞	14	38
Bottom	1	⅞	14	38
Drawer front	1	⅞	8¾	38
Base front	1	⅞	5	40
Base back	1	⅞	5	40
Base ends	2	⅞	5	16
Moulding		¾	¾	11 ft.
Drawer sides	2	½	8¾	14
Drawer back	1	½	8¾	38
Drawer bottom	1	½	15	38

2 handles, 2 locks with escutcheons, 2 hinges.

PAPER LANTERNS, SHADES AND DOMES.

C. A. Kunou, Supervisor of Manual Training, Los Angeles, Calif.

The teaching of paper construction in the elementary grades may be made valuable if the teachers seek to make the work their own, putting their individuality into it, and modifying and originating in the application of the courses and projects outlined by the supervisors.

The various handworks in wood, metal, clay, paper and textile materials are all arts and industries as well. The work in the grades need be no less educational because it possesses commercial and industrial values. The main point is to make the manual work constructive, not dilettanteish in nature. It should be industrializing and socializing in character. It should help create in the children the power of initiative. In the primary grades, manual work ought to be rather symbolic and of brilliant colors. As the work rises through the grades, it naturally becomes more staunch, structural and constructive, with correspondingly subdued colors. The effort should be to direct the attention of the pupils to the useful. The paper lanterns, notebooks, portfolios, boxes and the like, are means to such ends. The lanterns, particularly, are useful and fanciful, offering abundant opportunities in color, constructive and decorative design.

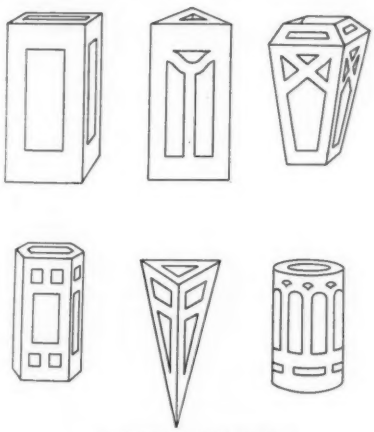
Construction of Lanterns, Shades and Domes.

Materials: Paper lanterns may be constructed of coverpaper, bristolboard, folder or tagboard. The material to be of sufficient thickness to give strength and stability to the structure. Paper lanterns may also be constructed out of pasteboard boxes, such as cracker and hat boxes, and may be square, oblong, hexagonal or round, and of various sizes.

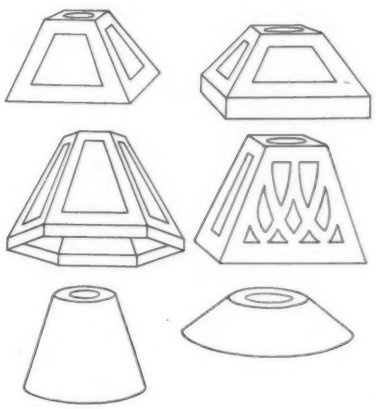
Method: First. Draw the outline of the figures on the sides of the body of the lantern. Cut out with knife or scissors and remove parts of the paper so that the opening becomes the outline of the patterns or figures, such as landscapes, ships, houses, birds, faces, etc. Pierce the paper in places for windows in houses, eyes in birds, animals, etc. Cover the openings with white, red, green or blue tissue paper, pasting the same to the inside of the lantern. Put the paste on the inside of the lantern, but none on the tissue, as the tissue will stretch and tear if wet. The cutting out and pasting on of the tissue paper should be done before the lanterns are fastened together.

Second. Cut out the entire panel-opening, leaving a margin of about an inch around the sides of the body of the lantern. Paste tissue paper on the inside of the opening. Draw and cut out figures using some opaque paper and paste the same to the inside of the tissue paper. This method is good in making lanterns of pictorial designs.

In using knives for the cutting out of the designs, a piece of zinc or heavy strawboard should be placed on the desk to protect it.

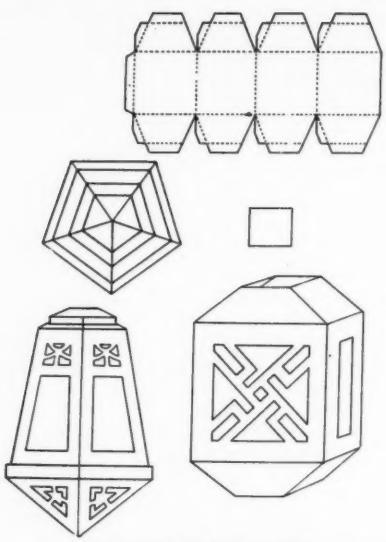


1. TYPES OF LANTERNS.

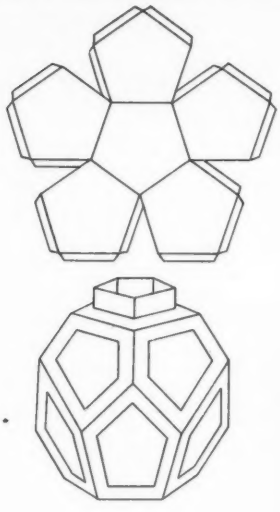


2. TYPES OF SHADES.

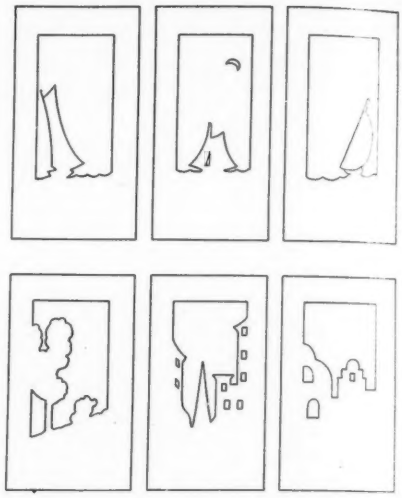
3. SUGGESTION FOR A SQUARE LANTERN.



4. SUGGESTIONS FOR DOMES.



5. DETAILS OF A 12-SIDED LANTERN.



6. DESIGNS FOR SQUARE LANTERNS.

Third. On a piece of folder board or some other thick paper, draw and cut out one side of the lantern, including the decorative design. Then use this as pattern or template tracing around it making as many sides as may be desired. Templates are especially convenient in making paper shades and domes.

A CONCRETE BENCH.

Robert S. Condon, Bloomington, Ill.

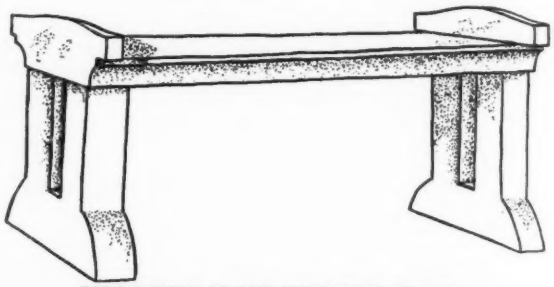
This bench may be used in a garden or park and is useful for a building entry where a wooden bench may be exposed to the weather. It affords an interesting problem in building the wood forms, in planning the reinforcement, in pouring the concrete, and in finishing the surfaces.

SECURING UNIFORM WEIGHT OF LINES IN THE DRAFTING ROOM.

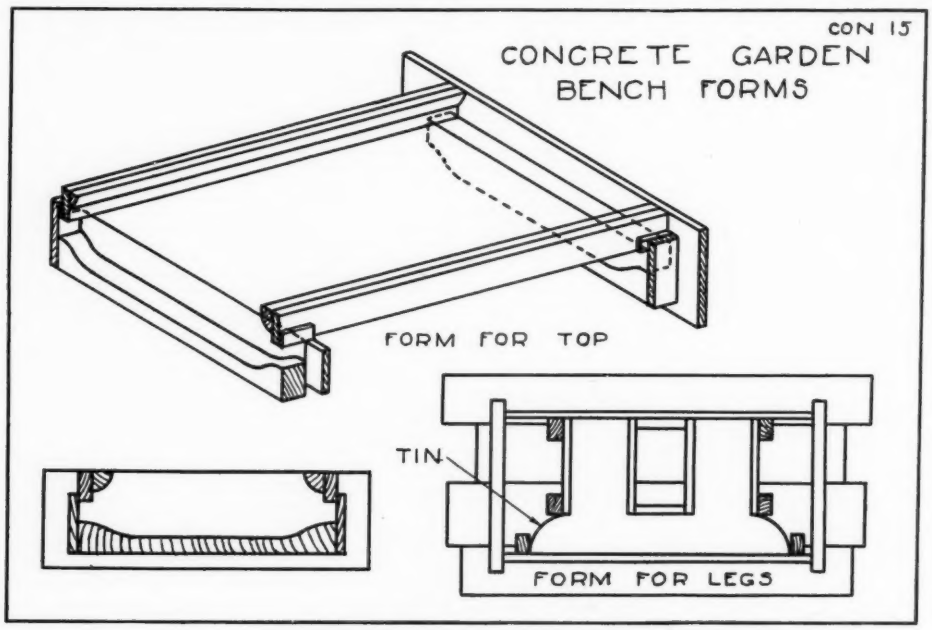
W. W. Sturtevant, South High School, Minneapolis, Minn.

For some time I experienced considerable difficulty in securing a uniformity in the weight of lines used by the boys in the drawing classes. In spite of repeated talks on the subject each boy seemed to have his own idea of the correct weight of lines to be used.

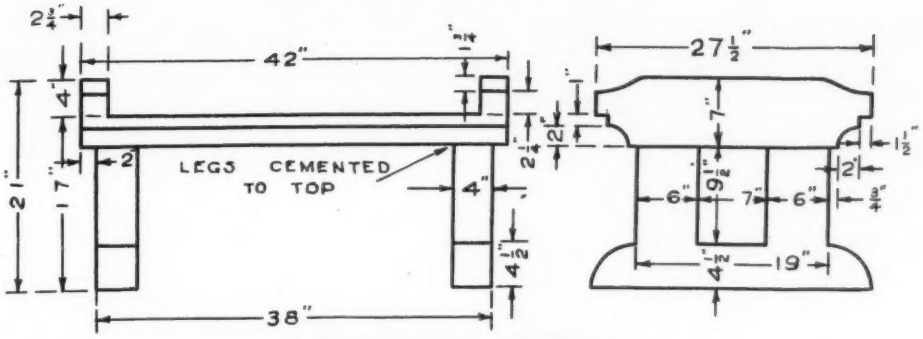
Generally the outlines were too light and there was not enough contrast between outline and center or dimen-



PERSPECTIVE OF THE COMPLETED BENCH.

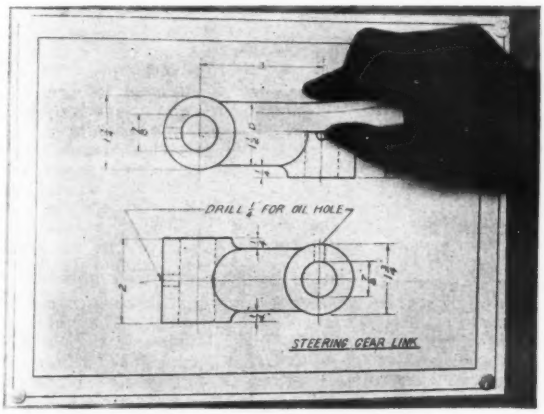


DETAILS OF A CONCRETE BENCH.



DETAILS OF A CONCRETE BENCH.

sion lines. Frequently there was a decided difference in the weight of lines on the same drawing, particularly between the lines drawn with compass and those drawn with the ruling pen, so that arcs and straight lines were of unequal weight.



To correct this I ruled up a sheet of paper with alternate light and heavy lines—the light line the desired weight for the center and dimension lines, and the heavy line the correct weight for the outline.

Next, I cut the sheet into small strips, each showing the two lines and gave one of the strips to each member of the class with instructions to use as shown in the photograph.

The result has been a very decided improvement in the general appearance of the drawings handed in.

VOCATIONAL EDUCATION RESULTS.

In discussing vocational guidance, John M. Brewer of Harvard University recently said: "Workers in vocational education have been singularly backward in measuring results. Even an adequate system of follow-up, to see if the occupations learned are followed, is sadly lacking as a general policy. Spelling, arithmetic, and penmanship teachers have made far more progress in measuring results than have teachers of vocational education. Research in this field is bound to be fruitful for purposes of vocational guidance.

"Measurement in the matter of first jobs and the efficacy of placement is hardly conceivable until we have more data on adaptations, changes of job, early experiences, methods of initiation, and other such important questions. Of course, the cost of placements has been measured, and the number of changes which young workers make during their first years.

"An adequate system of employment supervision which would follow up the individual from his first job until he has achieved vocational success would utilize almost all the methods of measurement we have described. A very much needed piece of nation-wide investigation is the collection of data for establishing a system of index numbers for incomes.

"If the incomes of a thousand typical workers in each occupation could be determined, we could take a middle figure as the 100 point, and chart these central tendencies and the range of the middle fifty per cent in each occupation, and thereby provide a very helpful chart for purposes of vocational guidance. In this long process of readjustment, rechoice and promotion, measurement is needed to aid in self-rediscovery, to provide more enlightenment about the world of occupations, and to secure new placements. The world of occupations for many workers is a thick fog of ignorance and confusion. Research involving measurement and other scientific methods will help to dispel this fog.

MR. SOWERS TO FLORIDA.

Mr. J. I. Sowers recently vocational director at Vincennes, Ind., has been elected head of the department of vocational education for the city of Miami, Fla. Up to the present time no vocational program has been in force in the city of Miami and it will be Mr. Sowers' duty to study the local situation and to establish and direct a comprehensive program in the elementary and secondary schools. There is considerable interest in vocational work in Miami, due to the efforts of superintendent of schools, Chas. M. Fisher and state supervisor L. S. Greene.

MR. J. I. SOWERS,
Miami, Fla.

Mr. Sowers has been connected with the Vincennes schools during the past seven years except for one year when he was on leave of absence as vocational advisor for the rehabilitation division of the Federal Board for Vocational Education. Previous to coming to Indiana he was a teacher for two years in North Dakota State School of Forestry and an instructor for five years in the St. Paul schools. He is a co-author of the well-known book "Trade Vocations" and of Borrowman's "Card Text System of Cookery."

NOW ARE THERE ANY QUESTIONS?

Reproducing Designs.

374. Q: I am very much interested in your magazine. Am I allowed to reproduce designs which appear in its pages?—C. T. B.

A: Yes and No. The problems and projects, the furniture, tools, machines, stencil designs, household utilities, and what not reproduced in the papers and departments of the Magazine, are all printed to aid teachers and others in making similar articles. Commercial articles illustrated by courtesy of the manufacturers may not be reproduced or copied.

Painting Problems.

375. Q: I have just finished painting some scenery for the local high school. The school board asked me to do a pair of ornamental lamp posts (iron) located at main entrance in Verde Antique. I have no experience in that line of decorating, but am certain that I could do it if I was informed as to the material used and method of application.—C. A. M.

A: In preparing ornamental iron lamp posts for a verde antique finish, the following specifications will produce first class results.

1. Wash the raw iron posts with a steel brush and a solution of sal-soda at the rate of one pound per two gallons of boiling water. Be sure that all scale is removed.

2. Prepare a red lead primer coat by using 30 pounds of dry red lead, 3 quarts of raw linseed oil and one quart of boiled linseed oil. This will make a five quart batch. Brush on thoroughly being sure to cover all fine cracks and moulded work thoroughly. Let dry three days.

3. Make up a ground color of a shade known to the trade as dark bottle green. This should be prepared with a varnish (Spar) binder and thinned with turps. Brush on so as to cover well and let dry until thoroughly hardened. This should dry so as to form an egg shell or semi-gloss surface.

4. Make up a glazing coat from Prussian Blue, light chrome green, and zinc oxide to form a greenish shade of turquoise. This may be applied in stipple form with either an old stubby bristled brush or a dampened sponge which has been brushed or with a cheese cloth much crumpled. In using the glaze coat avoid over-doing the effect and tend rather to produce a gray green blue combination, typical of greased copper that has been exposed to the weather. It is suggested that you visit some high grade store displaying electric lamps where you will generally find high grade examples of the desired finish—**Ralph G. Waring.**

Oregon Yew.

377. Q: Many of the Boy Scouts here are interested in archery and have tried to make bows out of hickory, but such bows are not capable of making the shots required in scout tests. We would like to know where we can get Oregon yew.—M. B. M.

A: Pacific or Oregon yew is manufactured and sold by the Carman Mfg. Company, Portland, Oregon, and the Pacific States Lumber Co., Oakland, California.

NEW BOOKS.

The Farmers Shop Book.

By Louis M. Roehl. Cloth, 432 pages, illustrated. Price, $2.85. Bruce Publishing Co., Milwaukee, Wis.

This book embodies the author's wide experience as a teacher of farm shop work. It suggests in the broadest way possible a great variety of appliances and utilities, which the farmer can make economically, and repair, maintenance and replacement work which he can—and frequently must—undertake. The book begins with the equipping of the farm shop and the simple processes of working wood, etc., and then proceeds with working drawings and specific directions for making the various appliances for field, barn, house, etc., etc. A great amount of information on tools and tool maintenance, hardware, etc., is introduced. The suggestions for metal, harness, rope, and belt work are chiefly in the line of repair.

The book is especially adapted for schools of secondary grades where well rounded courses in agriculture are offered and where the mechanical and shop activities of the present day farmer are recognized. The entire book reflects close contact with real farm conditions, and with the teaching capacity of the average secondary school in rural districts. The illustrations are complete and carefully printed.

Elements of Sheet Metal Work.

R. L. Welch. Cloth, 8 vo., 121 pages. Price, $1.10. Bruce Publishing Co., Milwaukee, Wis.

This book outlines for vocational and manual arts classes the fundamental principles of working sheet metal. Materials, tools, and machinery are briefly described, and the typical processes are introduced logically by means of carefully arranged problems. Commercial custom—shop methods and standard machines are used so that the student has acquired usable information, correct principles, and familiarity with typical commercial products. An appendix includes a wide variety of supplementary problems from heating and ventilating and architectural work.

Technical Mathematics.

Vols. I, II, III. Harry M. Keal, Nancy S. Phelps and Clarence J. Leonard. Cloth, Vol. I, 231 pages, price $1.50. Vol. II, 271 pages, price $1.75. Vol. III, 138 pages, price $1.25. John Wiley & Sons, New York, N. Y.

This series has been developed with three definite aims clearly in mind. It is, first, intended to meet the mathematical needs of boys and girls who are actively preparing for occupations as draftsmen or mechanics in machine shop work, patternmaking, electrical construction, sheet metal work, chemical laboratory work pharmacy, etc. It is, second, to provide useful mathematical information and skills for those who drop out before graduation, and who need help immediately for vocational ends. And, finally, it is to be ample for the students who will enter the university and who desire a broad mathematical foundation for further study.

The first volume includes three semesters' work in algebraic equations, ratio and proportions. The right triangle is introduced and problems taken from practical shop work are added in special informational chapters on mechanics. Book two develops the study of the triangle and carries on the geometric study in the fourth and fifth semesters. The third book covers oblique triangulation, spherical geometry, and an inclusive study of logarithms and the slide rule. Throughout the books give evidence of contact with the school shops and the mechanical industries. The entire material is presented in the usual careful style of the Wiley publications.

Food Planning and Preparation.

By Mabel T. Wellman. Cloth, 334 pages. J. B. Lippincott Co., Philadelphia.

This is in the best sense, a cook book in which recipes are neglected to the last third of the volume, and the principles of planning meals and diets, and of preparing foods take up the first two-thirds of the space and provide practically the entire material which is to be seriously studied.

The book is a distinctive advance over the old type of cook book; it is similarly a big improvement over the older books on food, because it combines all the facts of food selection, meal planning, cooking and serving into one well-balanced course.

PUBLICATIONS.

Punctuation for Printing Apprentices. A textbook for the apprentices of the printing trade school and a reference book for graduates. Prepared by John F. Locke and issued by the Printing Trade School, Cincinnati, O.

Elm Craftsmen. A yearbook published by the students of the Elm Vocational School, Buffalo, N. Y., for the graduates of the 1923 class.

Vocational Agriculture News Letter. Circular No. 8, May, 1923, issued by the division of agriculture of the state of New Hampshire. Contains brief accounts of the activities of the several schools in the various branches of agricultural work.

Some Industrial Art Schools of Europe and Their Lessons for the United States. Translated from the French by Florence N. Levy. Bulletin No. 48. 1922, U. S. Bureau of Education, Washington. D. C. Contains extracts from studies made for the French government by Marius Vachon.

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DEANE G. CARTER, B. S. in A. E.
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By SAMUEL SLADE, B. S., C. E., and
LOUIS MARGOLIS, A. B., C. E.
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IAM 10-23

NEWS AND NOTES.

Useful Articles of Furniture. The boys of the manual training classes of the Junior High School, Paducah, Ky., during the last year completed an extensive list of articles of furniture. The pieces were constructed under the direction of Mr. C. R. Moffit and have an estimated valuation of more than $2,300. For material and milling work the students paid out $725. The list of articles includes 68 taborets, nine footstools, thirty hall trees, ten shaving cabinets, three study chairs, sixty hat racks, 35 sewing cabinets, four morris chairs, two library tables, four piano benches, two magazine stands, two music cabinets, three cedar chests, one stool, two checker boards, eight dining chairs, one talking machine, one gum chest, one table lamp, one radio table, one bookcase and one chiffonier.

Vocational Funds. Springfield, Mo., will share in the federal and state vocational funds to the amount of $1,500. The funds are paid as reimbursement for money expended by the schools for vocational education.

New Vocational Courses. Vocational courses in plastering, plumbing and brick-laying will be offered for the first time this fall in the McKinley Vocational School, Buffalo, N. Y. The courses have the approval of the local trades' organizations and the time spent in school is credited as a part of an apprenticeship period.

Reestablish Supervisorships. The school board at Oshkosh, Wis., has voted to reestablish the supervisorships in drawing and manual training. An art course has been introduced in the high school.

Shops Turn Out School Furniture. Practically all of the furniture for the manual training departments of the four new junior high schools at Atlanta, Ga., has been constructed in the wood working shop of the technical high school. Director P. S. Woodward of the manual training department who was in charge of the work, was assisted by several of the wood working instructors at the technical high school and by outside help employed by the schools. All of the sewing tables, laboratory tables, drawing tables and scientific furniture were made by the teachers in this school. The furniture will be put to immediate use with the opening of the schools this fall.

Study Rehabilitation Problems. Mr. James A. Starkweather, of the Duluth, Minn., schools, has been made a member of a special committee which is to study vocational training problems as related to the rehabilitation of disabled service men. The committee comprises a number of the leading educators and business men of the country, and is headed by Senator Reed of Pennsylvania.

Vocational Conferences. A series of conferences in vocational agriculture were held at Auburn, Ala., during August for the benefit of teachers of the subject. The conferences which were under the direction of R. D. Maltby, of the Federal Board, dealt with objectives in agricultural training, with the emphasis on problems in teaching.

Teachers Visit Employed Students. At Erie, Pa., two days are set apart at the close of the first semester for the trade instructors to visit the graduates of their courses employed in the local industries. These visits are intended to aid in the future placement of students, to strengthen and improve present trade courses, and to keep in close touch with the progress of the trade and industry in general. At the opening of the fall term, the trade instructor visits the home of the new first year students. About forty boys enroll in each course annually.

Standardize Drafting Practice. During the past year John F. Faber, chairman of the drafting teachers' committee at Erie, Pa., sent questionnaires to forty industries of the city in an attempt to learn the standards which obtain in the commercial drafting rooms, and to effect a plan for standardizing the practice in the school drafting rooms. The results of the questionnaire have proven very satisfactory.

Graduates Readily Employed. The demand for graduates in most of the ten trades taught in the schools of Erie, Pa., has far exceeded the supply for the year, according to reports of the placement department. The local manufacturer's association, the office of the state employment bureau and other agencies cooperated in placing the graduates in suitable positions.

Summer Vacation Work. During the summer months, ten teachers and a number of the trade students of the

(Continued on Page XXIV)

Essay Contest, Conducted by American Wood Working Machinery Co., *on the Educational Value of Cabinet Making*

closes September 10th

The City Public Schools
St. Cloud, Minnesota

RUTH HILPERT
GRADE SUPERVISOR

Educational Department,
American Wood Working Machinery Co.,
Rochester, N. Y.

Gentlemen:

I am in receipt of your favor of August 15 together with the fountain pen. May I thank you for your kindness in sending me the pen as well as a personal letter in reply to my essay. I am sure that we who have written essays for this contest have been greatly repaid, first by the gift of the pen, secondly, by the book we eagerly look forward to, containing the essays, and third, the reward which cannot be measured in money—the renewed interest we have in our work after organizing it into words which have made it more concrete and valuable to us—it has helped us to make life a little more worth living and has increased our pride in our work.

Thanking you, most sincerely, I am

Yours Truly,

Ruth S Hilpert.

Teacher of General Shop
Manual Arts Department.

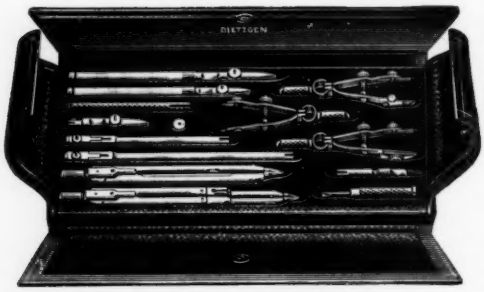
The receipt of this letter alone would have made the contest worth while to us--But we have many letters like this.

It is a great satisfaction for us to know that we have helped so many teachers of wood working in all the land to a larger and better perception of the importance of their work.

The result of the Contest—prize awards, etc. will be announced in due time

American Wood Working Machinery Co.

Educational Department Rochester, N. Y.



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(Continued from Page XXII)

Erie, Pa., schools were employed by the school district. At East High School, the print shop ran at full capacity. At the Academy School Shop, two teachers and twelve boys were employed continually, and at the East High School Shop, one teacher and three boys were employed in building furniture for various departments of the schools. Teachers and students of the electrical department made changes and carried out repair work at various buildings.

Schools Organized on Shop Plans. The Gridley and Roosevelt Junior High Schools at Erie, Pa., have been organized on a modified general shop plan. Two shops are operated at both these schools. One room is equipped with complete wood working equipment and the work offered has been extended to include repair jobs along the line of home mechanics. These include painting, glazing, setting hinges and locks. The second shop which adjoins the wood working shop, offers three units of work, namely, printing, electrical construction and sheet metal work. The printing is limited to that work required by the social activities of the schools, including the printing of tickets, programs, simple forms and the printing of the school bulletin. The electrical and sheet metal work are of an elementary character. The work is arranged in the form of lesson sheets which are offered as an aid to instructors in carrying out the teaching phases of their work.

Evening course in Printing. The New York Evening High School in the Washington Irving High School, is offering a free evening course in advertising typography, preparation of copy, proof reading and cost estimating for advertising and editorial writers, printers, proof readers and office-workers in the allied occupations. The course is conducted by Mr. Arnold Levitas, assisted by Mr. William I. Orchard, and the sessions are from 7:30 to 9:30 P. M.

Hat School. At Danbury, Conn., a school to teach men the trade of hat sizing has been opened. It is connected with a large local hat manufacturing establishment, the Mallory Hat Company.

Add Third Year. A third year in industrial arts has been introduced in the Middleton, O., high school. It affords a semester's work in each applied electricity and gas engines. Girls in the corresponding year may take millinery and dietetics.

Continuation School Grows. The Schenectady, N. Y., continuation school has grown so much that it will occupy the entire Edison school in September. Three instructors have been added to the staff and further men are to be employed. Sheet metal work has been added and the drafting and woodworking departments have been enlarged.

Eleven Months' School. A request of the Paterson, N. J., vocational school for the adoption of a ten month school year in place of the eleven month year was disapproved by the board of trustees of the school. The trustees reaffirmed their previous recommendation to continue the school on the eleven month basis as originally planned for when the school was started, but recommended to the board of education that where the teachers wish leave of absence without pay during July for the purpose of professional improvement, such leave be granted, provided not more than two teachers are away from the school at the same time, and that satisfactory substitutes can be procured to conduct their classes. The teachers wanted the ten month year so that they could take up summer courses at colleges and universities to improve themselves in their respective lines.

Rehabilitation. A total of 218 injured persons have entered upon training in the state of Tennessee from June 30, 1921, to June 30, 1923. The cost has been $33,300 and is declared satisfactory from a social and economic standpoint.

Vocational Schools Planned. The New York City board of education proposes to erect in 1924, two vocational schools of secondary grade and a continuation school at a total cost of $2,975,000.

National Picture Week. The American Art Bureau, of Chicago, an organization devoted to the promotion of art in the home, has announced a national picture week, to be held during the week of October 8th to 14th. During this time an effort will be made to focus national attention upon pictures and their place in everyday life.

Thousands of articles and photographs will be utilized in showing the placing of pictures by the leading newspapers of the country. There will be radio broad-

(Continued on Page XXVI)

A general view of the Printing Department of the Seymour Vocational School, Newark, N. J.

The *Kelly Automatic Press*, a machine that produces the finest kind of printing at a speed of 3,500 impressions per hour.

Printing + Interest = Education

THE PRINT SHOP OF THE SEYMOUR VOCATIONAL SCHOOL, NEWARK, N. J., is not shown for the sole purpose of showing you the equipment, although you are probably interested in such equipment, but there is a greater significance in the picture. Note the interest of these future printers in their work. So great that not a boy even looked at the camera. They are printing their school paper, a beautiful twenty-four page booklet.

Boys, the sizes and ages shown, are not interested in a subject that doesn't appeal to them. Printing fascinates most boys. It teaches them the use of punctuation marks, the making of proper margins, the use of good English, correct spelling, capitalization, and indention in an accurate manner.

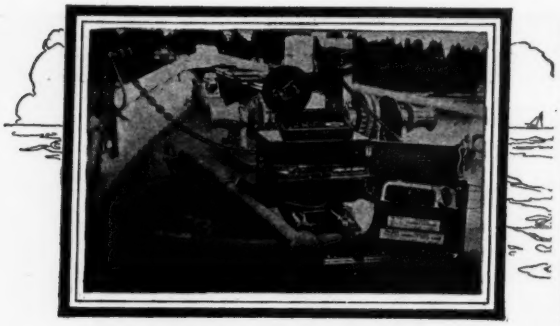
School Printing Outfits are inexpensive. They are designed for manual training, pre-vocational, vocational, trade, journalistic laboratory, and the four-activities-in-one-room types of instruction. The smallest school communities and all other types of schools to the the largest universities are installing printing.

Write to-day and ask for information regarding the printing outfit designed for the phase of education in which you are particularly interested. For personal attention, address it to:

F. K. PHILLIPS, *Manager*, EDUCATION DEPARTMENT

AMERICAN TYPE FOUNDERS COMPANY

300 COMMUNIPAW AVENUE
JERSEY CITY, NEW JERSEY



MacMillan's choice

Donald MacMillan chooses his equipment for a Polar Expedition as carefully as he chooses his personnel. Tools and men — they **must** be reliable, for there is no test of character as severe as the arctic.

Starrett Tools accompany this world-famous explorer on every expedition to the frozen North. Starrett Tools are keeping the "Bowdoin's" engines tuned, her machinery in perfect trim—making nice adjustments on wireless and the most sensitive instruments — sure and reliable in every day service and ready for any emergency . . . . . .

MacMillan knows the tools he can trust.

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
ATHOL, MASS.

The Starrett Catalog No. 22CE describes the tools shown in the photograph above (taken on board the "Bowdoin"). Send for this catalog showing over 2100 fine precision tools—you will be interested in some of the new additions to the Starrett line. Mailed free to any address.

Starrett Tools

5671

(Continued from Page XXIV)

casts by lecturers of authority and efforts directed toward the simulation of public interest in pictures.

To interest the children in creating an influence on art in the home, an essay contest is planned, in which children of the entire country will participate. The details of the contest are to be handled through representatives of the bureau in the several important cities of the country, and educators of the nation will be urged to support and encourage the movement.

Cooperative Course. At Moscow, Idaho, the facilities of the local state university are utilized in the conduct of a special part-time course for advanced students with teaching experience. These students spend part of their time in advanced study of educational problems at the School of Education of the university. The cooperative effort, now two years old, has grown rapidly to the mutual benefit of both schools. Supt. Soulen of the public-school system is professor of educational administration at the university.

Travel for Trade Tutors. The board of examiners for the New York City school system recommends periodical leaves of absence to trade school teachers in order to learn the progressive changes going on in their field of work. In a report the following statement is made:

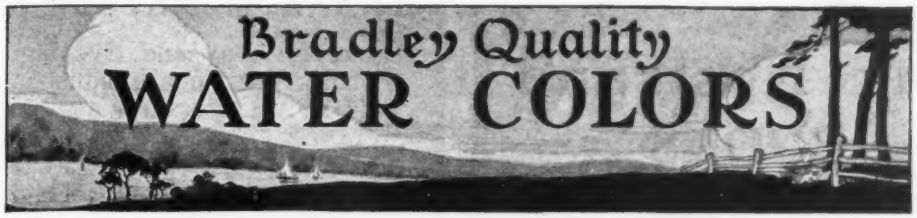
"Vocational education has received an enormous impetus in the last few years. Not very long ago we had no such classes in our schools. Now there is an ever increasing demand for the extension of every type of vocational training to meet the requirements of the business and industrial life of this city which has become the most complex industrial center in the world. What is needed are teachers who combine higher academic training with practical experience in the trade. The ideal teacher for these classes would be the one who had a broad liberal education in a college or technical school together with several years of practical experience in the industry or trade. Although a combination of these essentials is not easy to find, it is encouraging to note that gradually more and more candidates who have those qualifications are presenting themselves."

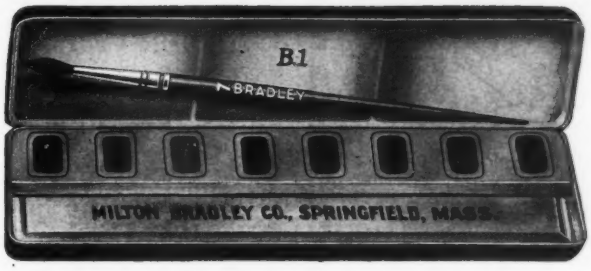
Requirements for Vocational Teachers. The board of examiners of the New York City board of education has adopted new rules governing the requirements for eligibility to teach vocational subjects in elementary schools. The minimum requirements are five years of satisfactory experience in the vocation or trade in which the applicant seeks a license, together with two years of experience in teaching the same vocational or trade subject and a general education satisfactory to the board of examiners. A satisfactory course in the principles and methods of teaching the vocation or trade, pursued for one year, and comprising sixty hours of work may be accepted in lieu of one of the two years of teaching experience. The completion of a two-year course in the normal and training school for industrial teachers may be accepted in lieu of the required two years of experience in teaching. The board has also worked out a salary schedule based on a ten-year period. Partial credit on the schedule is granted for previous experience in teaching and for experience in a related trade or profession provided the experience is in excess of the eligibility requirements.

Essex County, N. J., has voted for a county vocational school system. The measure when brought up for action at the board of freeholder's meeting was opposed on the theory that the task of vocational training should be left to the municipality in the county, namely, the city of Newark. This city has an investment of $1,000,000 in vocational schools. The board voted to maintain a county industrial and household arts school.

Industrial Education in Missouri. The state vocational board of Missouri has issued its annual report on the activities along trade and industrial lines in the state. The report shows that trade and industrial education has experienced a steady growth since its inauguration. Both employers and organized labor have shown an interest in industrial schools and the important events of the year have been marked by the active cooperation of representatives of organized labor and employers. The amount of state and federal funds disbursed for approved industrial courses during the year 1922-23 was $82.482. More than half of this amount went to the Kansas City schools, with St. Louis a close second, and Springfield third in the amount of aid given.

(Concluded on Page XXIX)





THE BRADLEY LINE covers a wide range of colors, in a great variety of assortments. The water colors are semi-moist, in tubes and pans, with a limited number in dry cake form.

From elementary classes to the advanced art schools Bradley Water Colors are recognized as the standard mediums for color instruction. Their uniform high quality, combined with moderate cost, make the Bradley Line the most widely used water colors in school work, and that is the purpose for which they were especially created.

All Bradley Water Colors are American made and perfectly standardized, so that any colors may be exactly duplicated at any time.

Bradley Tonal-Tempera Poster Colors

TWENTY-EIGHT colors are offered in this line, put up in 2 oz. jars. The Tonal-Tempera Colors are opaque with great covering qualities. The colors are distinctive, being particularly appropriate for striking poster and show card work. The colors dry with a velvety surface which does not reflect the light.

The Bradley Tonal-Tempera Colors are made from the best pigment obtainable, and are widely used by the best poster designers.

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PRACTICAL TESTS *for the* ELECTRICAL LABORATORY

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A sound text that covers all branches of electrical laboratory work that can be attempted with modest apparatus.

An early introduction to alternating currents is a feature of this practical, logical book. Teachers appreciate its clarity that saves lengthy explanation.

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A brief text for a fundamental course, that states theory simply and understandably. Especially suited for short or review courses.

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Books for Day and Evening High Schools, Vocational, Industrial and Y. M. C. A. Classes:

Notes for Mechanical Drawing

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Brief Course in Machine Drawing

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Shop Mathematics
by Edward E. Holton

Forge Shop Practice
by J. D. Littlefield

Progressive Exercises in Typography
by R. L. Loomis

All of above sent for examination on ten days' approval

THE TAYLOR-HOLDEN CO.
Springfield, Massachusetts

to complete the tool kit

Nothing like a steel tape for obtaining accurate measurements. By its use, the student is held to a higher degree of accuracy in his work. For manual training, we recommend the

K & E "HANDY" STEEL TAPE

in either 25 or 50 foot length. A thoroughly reliable tape, graduated in inches and 12ths on heavy steel ribbon.

"KECO FINISH" deep black rustproof lends permanency and sharpness to the graduations.

"READY READING" subdivisions simplify reading the tape and prevent errors by repeating the foot marks throughout length of line.

The "Handy" has self-opening handle and is furnished in neat, durable "leatherette" case with nickelplated mountings.

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KEUFFEL & ESSER CO.

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Drawing Materials, Mathematical and Surveying Instruments, Measuring Tapes

(Concluded from Page XXVI)

During the year, two cities, Kansas City and Springfield, conducted day trade schools with a total enrollment of 982. At Kansas City, training was offered in sixteen different trades. Four cities, with nine schools, conducted evening trade extension schools. St. Louis had five schools, Kansas City two, while St. Charles and Flat River had one school each. Enrollment in the evening schools reached 1,105. Part-time schools in seven cities had an enrollment of 5,221. These schools were located in Cape Girardeau, Hannibal, Kansas City, St. Joseph, St. Louis and Springfield.

Among the subjects taught in the different schools were the following: Cabinet making, carpentry, interior wiring, automobile mechanics, printing, electrical machinery, interior decorating, house painting, pattern making, masonry, drafting, sheet metal work, oxy-acetylene welding, steam fitting, shop mathematics, dye chemistry, blue print reading, foreman training, forge shop practice, millinery, dressmaking, commercial art and cafeteria service.

The amount of state and federal funds available for the year 1923-24 for trade and industrial education is $94,266, an increase of $12,450 over the amount distributed to these schools last year.

AMERICAN EDUCATION WEEK ANNOUNCED.

Supervisors of vocational and industrial arts work will be interested in the announcement of the United States Bureau of Education that Education Week for 1923 will be observed from November 18 to 24 inclusive. During the past three years the first week in December was selected for this purpose but experience has indicated that in certain parts of the country, weather conditions are unfavorable and in many school systems work in anticipation of Christmas which can't be disturbed, is under way.

It is estimated that fifty million people will be reached in 1923 during Education Week.

In communities where special visiting days or open house has been arranged, the manual training shops and the vocational shops as well as the agricultural departments and the domestic science departments have been lively centers of interest. In this connection it may be of interest to repeat the experience of the Seneca Vocational School, Buffalo, which held a special open house during an entire week in the winter of 1922. The purpose of the open house was to bring about closer cooperation between the pupils, parents and teachers of the school and if possible to bring into the institution taxpayers, employers, and prospective students who might be interested.

An entire week was set aside for inspection of the school and its various departments, because it was felt that many parents and business people would be unable to avail themselves of the opportunity afforded if only one day were designated. As it was, practically every boy enrolled in the school brought either his father or mother, or both parents, to visit the school.

Mr. Elmer F. Pierce, principal of the school, explained that it was the purpose to bring the parents so that they might become acquainted with the boy's instructors and understand what preparation the boy is receiving for entering industry.

Regular class instruction was held every day. The shops, laboratories and other affairs of the school were in session just as on any other day. The visitor, if he did not come with his boy, called at the office for the boy in whom he was interested. The pupil was then called to the office and acted as guide taking the visitor through the shops, laboratories and classrooms explaining the work as he went along. Whenever possible the instructor in charge of the room visited explained his particular type of instruction.

By special invitation the educational interests committee of the local chamber of commerce and the educational committee of the local electrical union, visited the school and many professional men were shown through the building.

Through charts, exhibits, placards and other means the visitor was taught, first that the purpose of the Seneca Vocational School is to furnish pre-employment industrial education to boys who plan to become broadly trained and highly skilled journeyman mechanics; and second, that the aim of Seneca Vocational School is to impart the technical knowledge and to develop the industrial intelligence and the manual and mechanical skills that are essential to the highest success and usefulness of the worker to perform his functions properly as a member of society.

STANLEY
TOOLS

Stanley Tools assure the best results. They are the first choice of master craftsmen.

No. 5 "Bailey" Plane; iron; 14-in. long; 2-in. cutter; Frog adjustable; Rosewood handle and knob.

No. 5

No. 20—6-inch

No. 20 Screw Driver. Standard head; blades of standard type, with proportionate tips and handles; handles are fluted and stained black.

No. 20

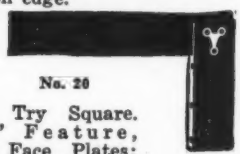
No. 20 "Everlasting" Chisel. Head, Shank and Blade of patented construction, and forged from one piece. Handle of selected Hickory.

No. 65¾

No. 65¾ Marking Gauge. Boxwood; polished brass screw; adjustable point and pencil; face plate.

No. 12 Hammer. Bell face, round neck and poll; curved claw. Made of special steel carefully forged, hardened and tempered. Handle of second-growth White Hickory. Pulling strain comes on body of claw, and not on edge.

No. 12



No. 20

No. 20 Try Square. "Hand-y" Feature, Brass Face Plates; blued blades; edges of blades are machined and are square inside and out. Rosewood handle.

THE STANLEY RULE & LEVEL PLANT.
THE STANLEY WORKS
NEW BRITAIN, CONN. U.S.A.

STANLEY SW New York Chicago San Francisco Los Angeles Seattle

APRONS

A POSITIVE NECESSITY

The boys need this protection. Parents appreciate it, and you will enjoy the added appearance of your class in uniform.

NOTE

Free Instructor's apron with your order of 12 or more aprons. 45" in length, a dandy apron. Price without accompanying order for students... See Below.

Used in Shops all over the country and for ten years the standard protection for students in the school work room.

Note these Features:

Adjustable Neck Strap
Large Roomy Pockets
Ample Size and Weight

Your choice of either brown duck or white. Guaranteed to be exactly like illustration.

Our large stock of these aprons makes shipment same day a certainty and our reputation and quality of merchandise insures your complete satisfaction. Goods sent prepaid anywhere east of Denver.

Size — 24x34

Prices of White Apron, each . .	70c
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Special Price on 100 Lot Orders.

Remember this apron is a positive economy as it saves the clothing and repays many times its original cost.

INSTRUCTORS' APRONS

Like Illustration at Left
45" Length

White or Brown Duck
Price Each, $1.10

or sent gratis with order for the student model.

NO BETTER PROTECTION CAN BE HAD THAN THESE APRONS. JUST THE APRON FOR TEACHERS AND ADVANCED STUDENTS.

You don't need to send any money with your order — just make out your order on your school stationery and mail it in to us. The aprons and the Free Instructor's apron will be mailed you prepaid by return parcel post.

SHOP COATS
Each, $4.90
Sizes—36 to 44
Mailed on Approval

Fine grade of Mixed Covert Cloth. Nicely tailored with large pockets and belted back. An elegant looking garment and just the thing for teachers or advanced students.

Coats are gratis with orders amounting to five dozen aprons.

CANVAS PRODUCTS CO.
BOX 363
FOND DU LAC, - WISCONSIN

ILLINOIS MANUAL ARTS MEETING.

The Illinois Manual Arts Association will hold its next meeting on Saturday, October 20th, at the Bloomington High School, Bloomington, Ill.

In arranging the program, it has been planned to have two or three leading speakers and five to ten men who will each give short discussions on a variety of topics not exceeding six or eight minutes in length. One of the principal speakers will be a manufacturing superintendent who will discuss the practical and industrial viewpoints in the study of students who become products of the shop. The business meeting will occur near the middle of the day instead of near the end of the program as in the past.

Information concerning the details of the program and speakers may be obtained by writing to President A. B. McCall, Springfield, Ill., or to Secretary L. S. Wood, Bloomington, Ill.

PERSONAL NEWS.

Mr. James McKinney, formerly connected with the educational department of the American School, Chicago, has been promoted to the rank of vice-president of the institution. Mr. McKinney will continue in charge of the educational policies and will broaden his sphere of work by engaging in some of the business management phases of the institution.

W. L. Thomasson, instructor of manual arts in the DuPont Manual Training High School, Louisville, Ky., has recently been appointed as coordinator for the schools. Prof. Thomasson who is the first to fill such a position, will act as the go-between for the schools and business concerns where students are employed while in school. He is charged with the duty of keeping in touch with the students while employed in the industries, and of assisting in bringing the students and business firms together.

Miss Ruth Ballard has been appointed teacher of household science at Mattoon, Ill.

Robert E. Murray, of Circleville, O., has been appointed teacher of manual training at Pontiac, Ill.

Mr. W. M. Phares, who for the last three years has had charge of the department of mechanical drawing and manual training in the Madison, South Dakota, high school, has resigned and has contracted as director of manual training in the Fort Dodge, Iowa, high school.

Mr. Phares has made quite a reputation in the line of manual training, having had ten years of teaching experience and five years of factory and shop experience.

Mr. L. H. Riker has been elected director of vocational education at Marion, O.

Mr. Arthur F. Hopper, director of industrial arts and continuation-school work at Plainfield, N. J., left on August 11th for an extended European trip. During his absence, Mr. Hopper will study industrial education, art and continuation school work in England, France and Germany. He also intends to visit some of the schools in Paris, Strasburg, Munich, London, Manchester, Edinburgh and Glasgow.

New Director. An assistant superintendent in charge of vocational work has been appointed at San Jose, Calif. At San Jose is located a very fine vocational school. Its printing shop has extensive equipment including a cylinder press, job presses, linotypes and intertype machines. The machine patternmaking, vulcanizing, automobile, sheet metal, forging, welding and cabinet making shops are also well equipped for the work to be carried on.

Prof. George Raab, formerly in charge of the Layton Art Gallery at Milwaukee, has accepted a position with the art department of James Millikin University at Decatur, Ill. At the same time he will be director of the Art Association Institute of Springfield, Ill.

New Vocational Departments. As a part of the development of vocational education in Pennsylvania, three departments of vocational agriculture were established on a fifty-fifty basis in September, 1923. By this arrangement, fifty per cent of the salary for the supervisor is paid from local funds and the remaining fifty per cent from federal funds. In view of the many applications on file for aid of these classes, there will no doubt be a large number of departments established this fall.

Art Work. Considerable work in decorating has been done through an art group at the McCall Continuation School, at Philadelphia, Pa. The work was given stimulus by the King Tut upheaval. The boys adopted the slogan "do your own decorating" and the keynote of the class was "happiness."

An old Venetian formula perfected for the modern student

Prang Reliefo, a relief paint for decoration prepared from an old Venetian formula and perfected for the modern student, craftsman and designer, opens a field of real and permanent value in school design work.

To the student who is specializing in art work, it offers a medium through which he can achieve effects rivalling those attained by the ancient craftsmen.

To the student who is not specializing in art work, but who has artistic tastes, it offers unlimited possibilities for home decoration.

It is easy to work with, both for the individual and for the class. Color and relief are procured at one application. It requires no heating, being ready immediate for use. It may be taken up quickly and put down at the end of the class period without injury to the problems.

It is prepared in nine colors and the natural (ivory), which may be combined to produce other hues. It can be applied to any kind of surface.

The retail price of a two-ounce jar of Reliefo is fifty cents. Write for our booklet, which will tell you what Reliefo is, what it accomplishes, and how to use it.

THE AMERICAN CRAYON COMPANY

ESTABLISHED 1835

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"The Old Faithful"

Build Your Own PHONOGRAPH

One of the most interesting and instructive problems in Manual Training, one that will not fail to arouse the pupil's enthusiasm, is the building of a phonograph. It provides one of the best problems in advance cabinet making. It involves the elements of good design, requires accurate cabinet work, and offers an exceptional opportunity in wood finishing.

Manual Training Teachers: Let Your Pupils

Build a Choraleon Phonograph

We furnish plans, blueprints, motors, tone arms, case material,—in fact, everything required, including, full instructions. Choraleon Phonographs are unsurpassed in tone. They play any record.

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SHELDON WORK BENCHES

will be of first importance in placing the industrial department of your school in the first rank. They have established a recognized standard for quality and design.

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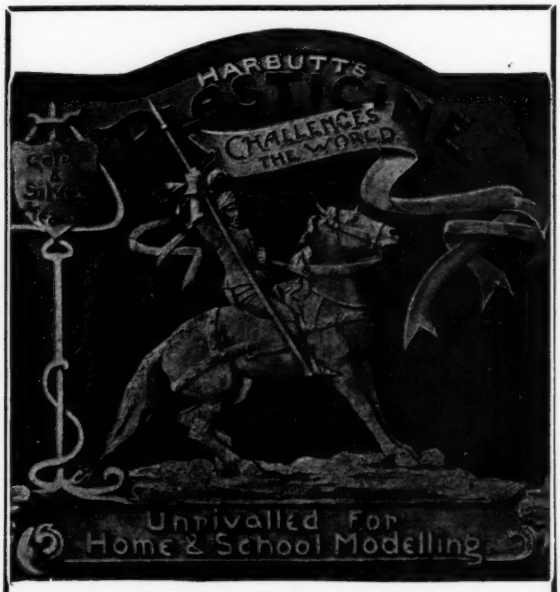

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Antiseptic and Never Hardens
J. L. HAMMETT COMPANY
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U. S. Waterproof Drawing INKS
NEW IMPORTED QUALITY

MADE IN BLACK

AND ELEVEN COLORS

Commercial Artists like U. S. INK, because its glossy, black surface photographs well.

Draftsmen like U. S. INK, because it flows freely and dries a deep opaque black, and it costs no more than ordinary ink.

"U. S. Blues Are the Best to Use."
Try a bottle.

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CHICAGO, ILL.

Vocational Aspects of Art Education. In a recent issue of the Newark, N. J., School Bulletin Miss Sara Elliott Lewis, special teacher of art urges the following reasons for fostering art studies in the schools:

"Today the demands of industry and commerce for trained designers and craftsmen can hardly be met. Some of these demands are:

"Designers for industries—furniture, lighting fixtures, wall paper, china and table ware, glass, pottery, textiles (including silks, cottons, woolens, embroideries), laces, upholstery fabrics, carpets, rugs, and linoleum.

"Designers and illustrators in the printing arts—magazine advertising, poster making, cover designing for books and magazines, illustrating, and the drawing of cartoons, and fashion plates; also designers for interior decoration and shop window decoration.

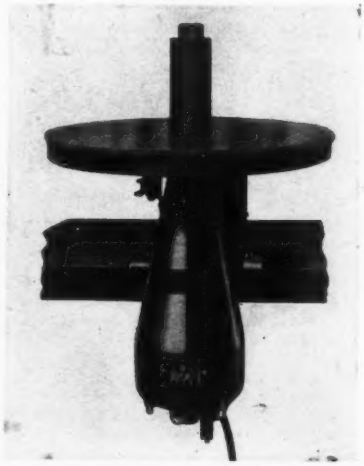
"Craftsmen in the arts—jewelry, silverware, bookbinding, wood-carving, stained glass, architectural modeling, tiles; also decorators for painted furniture, dolls and home accessories.

"There must be discovered and developed from the ranks of the public schools of this country those who will become trained designers and craftsmen; and most important of all, teachers must be trained to bring these things to pass.

BUYERS' NEWS.

New Spindle Borer. The Oliver Machinery Company has just put on the market a new electric portable single spindle boring machine for heavy duty work. The machine is so arranged that the rotor of the motor is mounted directly on the spindle of the boring machine, so that the motor itself has no bearings. In practice it has been found that the new arrangement eliminates belting, etc., increases efficiency, and in general makes the machine more powerful and simple. A special feature of the machine is a blower which is mounted directly on the spindle at the top of the machine. The machine is of especial interest in large vocational schools.

The Oscillating Spindle Sander here illustrated has just been put on the market by the Porter-Cable Machine Company of Syracuse, New York, for the pattern shop or woodworking factory that feels they have not enough internal or irregular work to warrant buying the larger machine heretofore offered.



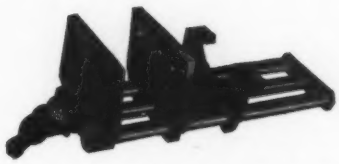
SYRACUSE OSCILLATING SPINDLE SANDER.

This machine is equipped with G. E. motor which has a speed of 1725 r. p. m. and is totally enclosed. Motor is connected direct through the spindle which has an oscillating movement of one inch, is equipped with ball bearings and furnished with 2¼"x6" roll. Table of this machine is ground, tilts 45 degrees down and 15 degrees up and is 16" in diameter. Weight of machine is 75 pounds and overall dimensions are 16x16x25.

This machine can also be placed on pedestal if desired.

New Electric Solder Pot. J. D. Wallace Company, Chicago, have just put on the market a new electric solder pot with automatic heat control. This efficient little unit can be attached to an electric light circuit and will heat

Vise Equipment of proven quality



Columbian Quick Acting Manual-Training School Vise

A solidly built, well finished wood-worker's vise for general shop use, particularly adapted to meet the requirements of elementary and high school manual-training departments.

Every shop in your school deserves the best in equipment.

Columbian sledge-tested vises offer that sturdy quality of construction which has made Columbian the largest makers of vises and anvils in the world.

There is a Columbian Vise for every department in your school. And all possess those exclusive Columbian features which make for strength, uninterrupted service and speedy, accurate operation.

When you buy vises, specify Columbian.

The Columbian Hardware Co.

World's largest makers of vises and anvils

CLEVELAND

COLUMBIAN

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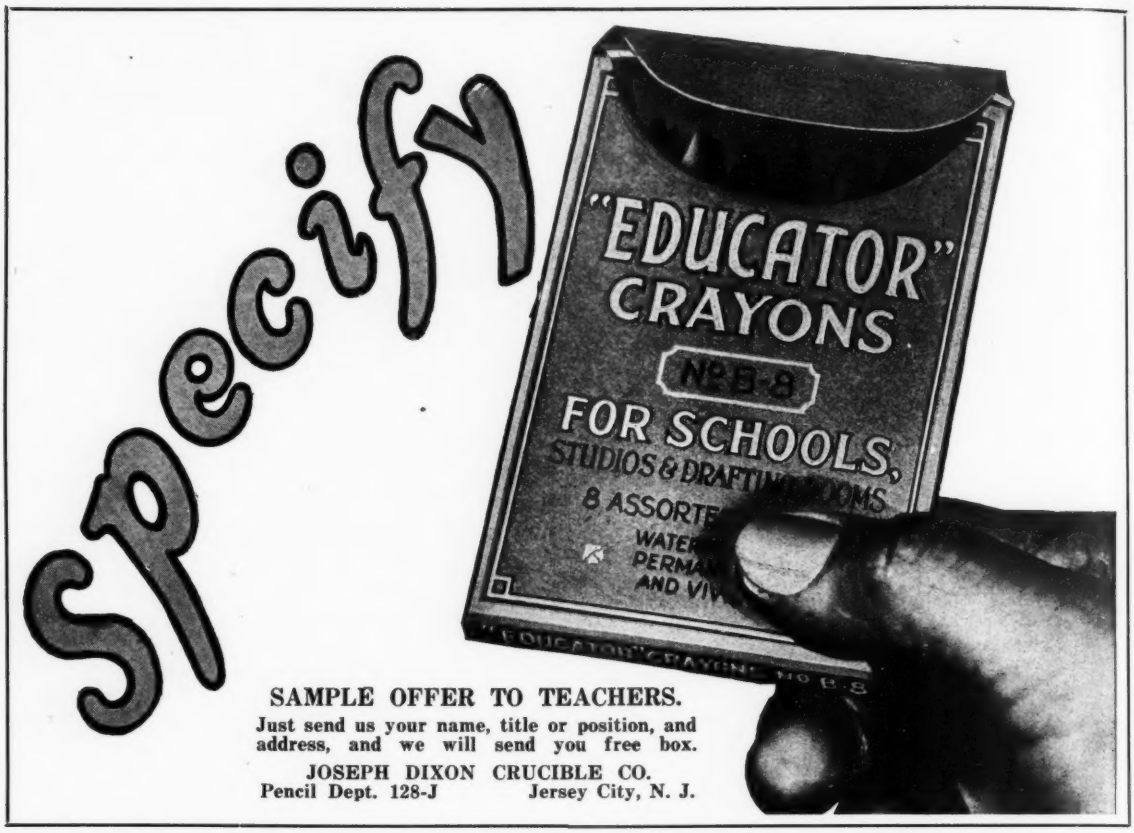

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Appoint Mr. O'Connor. E. C. Atkins & Company have just announced the appointment of Mr. John P. O'Connor as manager of the Seattle branch of the firm. Mr. O'Connor will be prepared to give service on the solution of problems relating to the selection and use of saws and other tools in the entire territory embraced in the state of Washington.

A New Drawing Instrument. The early linograph has recently been put on the market in a new form. As now arranged it provides in a single triangle of celluloid means for making engravings of 15, 30, 45, 60 and 75 degrees. It includes also a French curve and a means for ruling ⅛ and ¼ inch lines. The device is manufactured by Charles H. Robbins, 1209 Arch Street, Philadelphia.

School Book Type. The American Type Founders Company has just issued a new circular illustrating typical uses of Century school book and Century school book italic types which the firm has especially developed for use in textbooks, juvenile books and any other publications which reach young readers. Century school book is made in ten sizes, from six point to 48 point. The circular will be sent on request addressed to the educational department of the firm at Jersey City or to any of its selling branches.

Vocational Training. A pamphlet on opportunities in the machine tool building trade. Issued by the R. K. LeBlond Machine Tool Co., Cincinnati, O. The pamphlet through descriptions and photographs, attempts to show the way to acquire skill in the machine tool industry, while at the same time earning wages by taking the LeBlond vocational training course.

Heat Treating. The Chicago Flexible Shaft Company, 5601 Roosevelt Road, Chicago, has just issued an important chart on the heat treatment of metals. The chart contains complete details for heat treatment and the S. A. E. specifications for the composition of the most widely used types of carbon, nickle, nickle chromium, chromium vanadium steels and silico-manganese steels. The chart will form a useful addition to the reference material of any machine shop and forging department of trade and continuation schools. Copies will be sent free on request.

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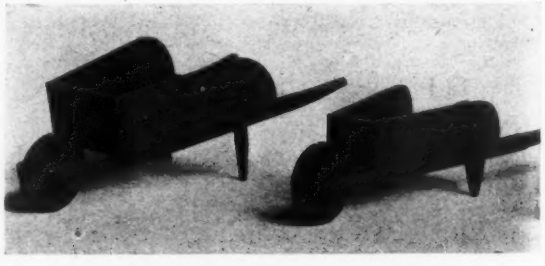

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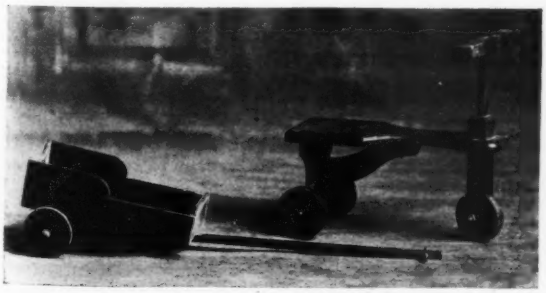

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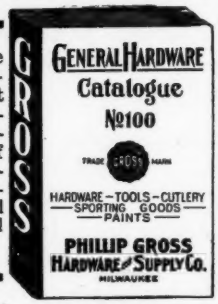

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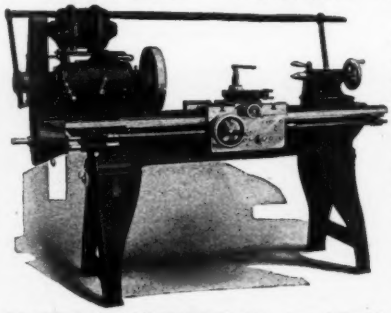

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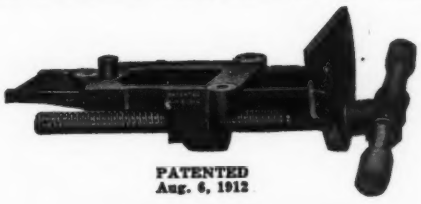

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Oliver Machinery Co.
Racine Tool & Machine Co.
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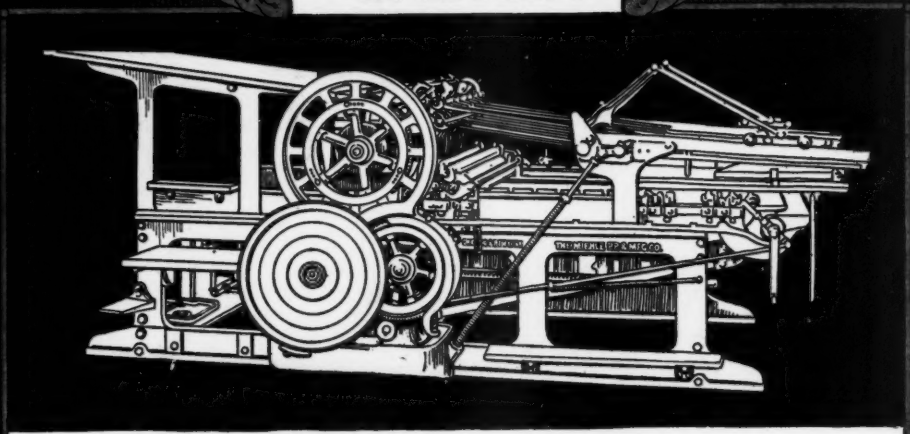

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